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<Index>

1. China's Military Rise and the US Strategic Framework for the Indo-Pacific: PROTECTION of ROK's National Interest.
/ Sangsoo Lee
2. PSYCHOLOGICAL HEALTH Relation between Perception, Appearance Satisfaction, and Happiness of Women Participating in Jewelry Therapy.
/ Chunyong Lee, Jaebum Lee, Eungyeol Na
3. Policy Tasks to PROTECT and Foster Korean Traditional Markets.
/ Jungmin Oh, Jaebum Lee
4. Color Reproduction with Drag Queen and Makeup PROTECTION.
/ Jiyeon Yeom, Jungsoon Choi, Jeongwoo Lee
5. Exploring the Effectiveness and Utilization of Terahertz Waves for the PROTECTION of Human Body.
/ Jaebum Lee, Taesung Kim

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China's Military Rise and the US Strategic Framework for the Indo-Pacific: PROTECTION of ROK's National Interest

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Abstract

Purpose: *This article examines China's military rise in the Asia Pacific region and the US-led response, based on its global strategy." This paper suggests that China's military rise is based on defensive realism as opposed to offensive realism. The basic assumption of this paper is that the US strategy has the goal of counterbalancing China's expansionism. The US response to China's expansionism is to check China's military rise as a superpower by strengthening its network of alliances in the Indo-Pacific region and Northeast Asia. In the Indo-Pacific region, the US has attempted to check China using the QUAD-Plus(Quadrilateral Security Dialogue with Japan, India, and Australia + Newzealand, South Korea, and Vietnam) which is a sea-based form of security cooperation.*

Method: *In this effort, the article uses a framework of international politics based on the theory of realism, which stresses the salience of "survival," "the maximization of national interest," and "self-help. A realist's perspective of the world rests on the following assumptions: the pursuit of survival, maximization of interests, and self-help. Defensive realists try to preserve power, rather than increasing it as the main goal of states. China's self-assertion in the South China Sea has been galvanized by the survival mindset against the US containment policy toward China.*

Results: *China's self-assertion in the South China Sea has been galvanized by the survival mindset against the US containment policy toward China. China's survival can be better secured by the occupation of the South China Sea to protect its sea lines of communication. China's militarization of the South China Sea and its military build-up can be illustrated as a self-help project for the maximization of its security interest in the Indo-Pacific region.*

Conclusion: *In this article, I have reached the following conclusions. China's military rise is based on defensive realism, not offensive realism. The basic assumption of this paper is that the US strategy is aiming at the counterbalance of China's expansionism. First, The US response to China's expansionism is to check China's military rise as a superpower with the network of alliance-making in the Indo-Pacific region and Northeast Asia. Second, China tries to build a military facility in the South China Sea to maximize its interest in terms of energy, fish, and security. Third, China's military build-up can be illustrated as self-help to meet the balance with the US formidable military might. In the Indo-Pacific region, the US tries to check China through the QUAD-PLUS.*

[Keywords] *US Global Strategy, China's Military Rise, Counterbalance, Realism(Offensive and Defensive), The QUAD Plus, South China Sea*

1. Introduction

Xi Jinping is pushing ahead with the modernization of the People Liberation Army(PLA) to achieve "China's Dream of national rejuvenation." China is making an all-out effort to build a "Second to None PLA" by creating three organizations: rocket forces, command headquarters, and a strategic

command division, to pursue a security strategy based on military strength. This represents a departure from its policy, visible across recent decades, of "peaceful rise." The US recently implemented the Taiwan Travel Act and strengthened its strategic cooperation with India as a part of its Indo-Pacific strategy. Vice President Mike Pence delivered a veiled warning to Beijing, saying that aggression should not be tolerated during the summit of the Association of Southeast Asian Nations (ASEAN) in Singapore in November 2018. He added that the US remained committed to upholding the freedom of seas and skies, "where we stand shoulder-to-shoulder with you on freedom of navigation."

The hegemonic clash between the US and China has driven the issue of DPRK's denuclearization into a stalemate. China realizes the importance of denuclearizing North Korea, but its priority is to decrease the level of US influence in the Indo-Pacific region. The purpose of this paper is to analyze US-China relations from the perspective of defensive realism. China is not yet a full peer economic and military competitor to the United States[1].

Defensive realists such as Waltz have emphasized the stability of the balance of power system, and such a view rests on the following assumptions: the pursuit of survival (Waltz), the maximization of interests (E.H.Carr), and Self-help (Mearsheimer)[2][3][4]. Mearsheimer, an offensive realist, builds his theory based on five assumptions: 1) anarchy as a self-help system with no guaranteed limits on others' behavior; 2) state inevitably possessing some offensive capability; 3) the uncertainty of states' future intentions; 4) the imperative of survival being paramount; "Survival is the primary goal of great power"; and 5) rationality, with the underlying assumption that great powers behave as rational actors.

This paper suggests that China's military rise is based on defensive realism as opposed to offensive realism. The basic assumption of this paper is that the US strategy has the goal of counterbalancing China's expansionism. The US response to China's expansionism is to check China's military rise as a superpower by strengthening its network of alliances in the Indo-Pacific region and Northeast Asia. In the Indo-Pacific region, the US has attempted to check China using the QUAD-Plus (Quadrilateral Security Dialogue with Japan, India, and Australia + New Zealand, South Korea, and Vietnam) which is a sea-based form of security cooperation. But South Korea has refused to join the US-led Quad-plus security dialogue for the national interest.

In this paper, I suggest that China's expansionism and military rise are best understood in the context of defensive realism, in contrast to offensive realism. China's assertiveness on territorial issues is based on its military capability, designed to counterbalance the US in the Asia Pacific region. The following three questions are addressed in depth below: First, in what ways will the US and its allies respond to China's military rise? Second, why is China consolidating its military capabilities in the South China Sea? Third, why is China building its military strength in the first place?

This article delves into the background of the rise of China's military and the responses of the US and its allies. To better appreciate the context of the PRC's military rise, this article illustrates the PRC's military build-up by applying realist theory. Defensive realists have as their main goal the preservation of power whereas offensive realists' ultimate goal is to become a hegemonic power in the system[5]. The main difference is that defensive realists are concerned with maintaining their positions in the system whereas offensive realists are concerned with maximizing it[6]. Waltz believes that "survival" (i.e., sufficient security) can be assured with power well short of the amount needed for "hegemonic" power as postulated by Mearsheimer.

This article also reviews the US and its allies' postures in the Indo-Pacific region. In chapter 2, it describes the problems of China's military rise; the chapter 3 delves into China's current military build-up. In chapter 4, it illustrates the US and its allies' responses. In conclusion, it briefly suggests the ROK's alternatives after reviewing the prospect of US-China relations.

2. China's Assertiveness Based on Offensive Capability

A trade war between the US and China may increase the possibility of military conflict in the South China Sea. Xi Jinping, who came to power in 2012, has publicly pronounced his willingness to

strengthen China's military and move China to the status of an economic superpower by realizing China's Dream and Belt and Road Initiative(BDI). China acquired several ports using the scheme of saddling poor nations with unsustainable debt to create client states. Countries such as Sri Lanka, the Maldives, and Malaysia have suffered debt problems from loans that lacked transparency. According to a recent study, eight countries are at risk of debt distress: Djibouti, Kyrgyzstan, Laos, the Maldives, Mongolia, Montenegro, Pakistan, and Tajikistan. Recently, China took a threatening military posture by intruding on South Korea's KADIZ(Korea Air Defense Identification Zone) without any pre-notification to the South Korean Army under the premise of reconnaissance. This example suggests that China's military confidence rests on its strong economy. China's military rise and assertive posture in the South China Sea has triggered a change in the security environment of Northeast Asia < Table 1>.

Table 1. China's military rise in the context of the northeast asian security posture.

Conflict with Japan	-Senkaku Islands dispute -Conflict in developing gas in the East China Sea
Conflict with Asia and the US	-The territorial dispute in the South China Sea
Conflict with the ROK and the US	-The territorial dispute in Socotra Rock -ROK-US combined Military exercise.

China tends to prefer a bilateral approach to the use of force and coercion, denying outside engagement in territorial disputes with neighboring countries, including the disputes in the South China Sea. There are two perspectives on China's military rise. The first, reflected by John Mearsheimer, is that with China's rise, the US and China are on the verge of a military confrontation. The second, held by Hugh White, is that US sharing power can stabilize the Asian region. Orville Schell and David Shambaugh suggest that they do not agree with the offensive realist idea that we should be working harder to contain or even to confront China before it becomes even stronger[7]. They claim that isolation would encourage the Chinese to become hostile and to adopt policies conflicting with US interests and values. It would not help the US effort to stabilize Asia.

Randall Schweller also suggests that in terms of hegemonic military power, the relative rise of China and the decline of the US are still entirely compatible with a future relationship of peace and harmony. China currently wants to have more global influence; the US wants less[8]. Chinese interests may be best served by a defense realist position that avoids "reckless" actions and assertions[9].

The primary objectives of China's foreign policy are peace and development since the end of the Cold War[10]. China is catching up with US military technology with the modernization of its science sector. Military reform in the PRC has once again reaffirmed the Chinese Communist Party's authority over the People's Liberation Army. China is not comparable to the US in terms of nuclear capability but compensates for this shortfall with asymmetric weapons such as the hypersonic weapon that can strike the US mainland. China's rise may result in other problems, perhaps making it more likely to threaten its neighboring countries. If China wages war somewhere in Asia could be harmful to all of Asia and the US. However, a prosperous and peace-loving China could also attract foreign investments, including from the US. Friendly relations between the US and China could lead to a spillover effect, stabilizing the region and enhancing economic and diplomatic cooperation.

China is challenging the US-made world order by raising several issues, with China's self-assertion based on an ideology of Chineseness(China-centered world order)[11]. The US cannot sit idle over China's challenge. The US policy of containment, coined by George Kennan during the early years of the Cold War, remains in place. In this light, a minor military confrontation in the region has the potential of escalating into a wider war. The US now faces a policy dilemma: how to cope with China's military rise while mitigating the downsizing of Japan's influence in Asia. China's projection of naval power is expected not only to expand its maritime domain but also to deny foreign navies, especially the US navy, access to South China and East China Seas. This effort brings within closer reach China's long-term goal of project naval power to the third island chain of the North Pacific[12].

3. China's Military Build-Up for Self-Help

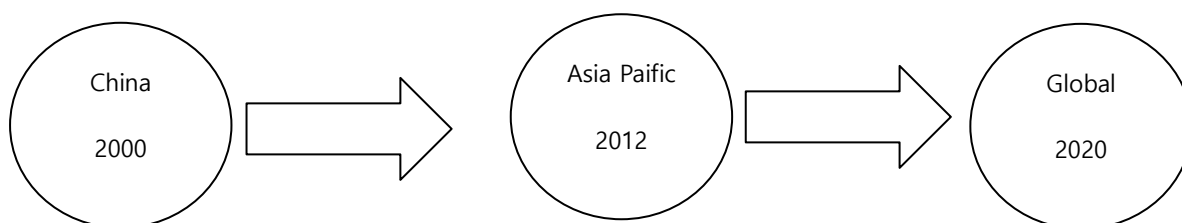
China's perception of the Indo-Pacific strategy is that the US is trying to contain it by connecting both the Indian Ocean and the Pacific Ocean. China regards the countries at the rim of the Indian Ocean, such as Myanmar, Bangladesh, Sri Lanka, India, and Pakistan, as places of strategic interest[13]. China thinks that the US, Japan, and Australia's policy of engagement in the East and the South China Sea is groundless[14]. China is also attempting to expand its influence in South America by expanding its currency swap with Argentina and setting up diplomatic relations with El Salvador.

China's military power is the second strongest in the world, excluding nuclear forces, with military expenditures having increased 4.9 fold from 1994 to 2015. China had 17 Aegis-equipped vessels and has already built four destroyers of O55 levels as of 2017. China's military expenditure reached \$261 billion in 2019, a 5.1 percent increase compared with 2018. However, it is widely believed that China's actual military expenditures are up to three times higher than the announced number. China's military power is not equivalent to that of the US, but it can limit the projection of US power with cutting edge weapons such as anti-satellite missiles and hypersonic nuclear missiles. China's current military posture is a serious threat to the US Army.

3.1. Development of cutting-edge weapons

China is developing its high-tech aerospace weapons, regarding a space-based system is fundamental in the strategy of resisting its adversaries. China's goal includes developing a "real-time surveillance, reconnaissance, and warning system and increasing the number and capabilities of its space systems, including various communications and intelligence satellites and the Beidou navigation satellite system <Figure 1>."

Figure 1. Beidou navigation satellite system.



China's main advantage of having its system is the security of access in times of conflict. China has counter-space weapons such as kinetic-kill missiles, ground-based lasers, and orbiting space robots. China is concentrating significant R&D resources, including quantum satellites, nuclear fusion, and hypersonic technology, along with the deployment and "hardening" of an expanding constellation of multi-purpose satellites. The most remarkable armaments under development include a hypersonic weapon, an aircraft carrier, energy, and sonic weapons, and a beam rifle.

Dozens of PLA scientists have hidden their military affiliation and traveled to advanced western countries to work in areas such as hypersonic missiles and navigation technology. Since 2007, the PLA has sponsored more than 2,500 military scientists and engineers to study abroad, encouraging them to develop relations with researchers and institutions across the globe[15]. This global PLA network is useful in the development of expertise and technology. China also developed the ZKZM-500 laser rifle and is preparing for its mass production. China's rail gun was developed after the US but it is allegedly superior to the US in destructive power. China is going to deploy the rail gun by 2025 for potential combat.

3.2. Strengthening the military forces

China has begun to build the largest landing ship in the history of the PLAN (Peoples Liberation Army Navy). Its development is connected with the creation of China's Marine Corps, bracing for con-

flict on the Korean Peninsula. The amphibious assault ship of 075 can hold 30 armed helicopters and will be capable of launching 6 choppers simultaneously. Should China possess the 075 landing ships, the PLAN is expected to be able to attack an adversary's warship or submarine and its ground forces in the South China Sea and the East China Sea and disputed areas of the Korean Peninsula. If the PLAN possesses the type 075 landing helicopter dock, China may pave the way to be the second most powerful navy in the world after the US.

China is developing the J-20 and J-31 stealth fighter. Moreover, China is developing a cutting edge bomber, the H-20, which has stealth capability. China's PLA has produced 300 of the J-100, which is a 4th generation fighter, and 250 of the J-11, under a license that is a local variant of Russia's Su-27. China has three air force bases in the Spratly Islands and that can cover the entire South China Sea. China can demand a flying schedule and location for any military aircraft passing through the area by declaring an ADIZ (Air Defense Identification Zone).

China's version of nuclear-capable wave-rider aircraft, called Xingkong, or Starry Sky, was developed by the China Academy of Aerospace Aerodynamics under the state-owned conglomerate China Aerospace Science and Technology Corp. The wave-rider can pierce through any anti-missile defense system while carrying conventional and nuclear warheads < Table2>.

Table 2. 2020 status of nuclear weapon states.

The US	French	China	United Kingdom	Pakistan	India	Israel	North Korea	Russia
5,800	290	320	195	160	150	90	35	6370

China's self-assertion in the South China Sea and repeated threats to its neighbors are a counter-strategy to the US' China containment policy. China's power politics are widely supported by domestic public opinion and ruling elites. A realist's vision of the world rests on the following assumptions: the pursuit of survival, maximization of interests, and self-help. Waltz emphasized "survival" as the ultimate goal of the state. China's self-assertion in the South China Sea has been galvanized by the realist mindset against the US containment policy toward China. China's survival can be better secured by the occupation of the South China Sea to protect its sea lanes of communication. China's militarization of the South China Sea can be regarded as self-help for the maximization of its security interest in the Indo-Pacific region.

4. The Response of the US and Its Allies

The completion of China's military rise may weaken the US security commitment toward Asia and threaten the US-ROK alliance. The increasing numbers of China's aircraft carriers can be a critical means to put the Korean Peninsula under Chinese military influence. Accordingly, the US needs to brace for China's military rise because the US is the main security impediment to China's continued rise[16].

4.1. The United States

The United States' Indo-Pacific strategy has three pillars: prosperity, security, and the rule of law and protection of individual rights, including religious freedom. The US will try to continue to ensure a free and open Indo-Pacific region with the strategy of "peace through strength." The US activity in the region is focused on "managing" the rise of China as a global power. The US has responded by boosting a network of alliances including India to check China's rise[17]. Most countries engaged in territorial disputes with China want security cooperation with the US. They are expecting the US to play a mediating role. The US is actively checking China by holding regular defense ministry-level talks with India amid a China and India territorial conflict <Table 3>.

Table 3. China’s neighboring countries, allied with the US.

ROK	- Relocation of the US Forces in Peongtaek - Deployment of the THAAD(Terminal High Altitude Area Defense)
JAPAN	- Construction of Missile Defense System
TAIWAN	- Supporting Military logistics and Cutting edge Arms.
MONGOL	- Joint Military Drill in 2005
PHILIPPINES	- Mutual Defense Treaty with the US
VIETNAM	- Mutual Military Cooperation Treaty with the US
THAILAND	- Mutual Defense Treaty with the US
KYRGYZSTAN	- Location of US Air Forces
AFGHANISTAN	- Location of the US Troops.
PAKISTAN	- The partnership of War on Terror
INDIA	- Joint Military Drill, Treaty of Nuclear Cooperation

The US Department of Defense introduced the MDO(Multi-Domain Operation) Doctrine to check China's march toward the Western Pacific Ocean[18]. Additionally, the US developed the third off-set strategy to counter China's rising military power.

The Third Offset Strategy was initiated by Secretary of Defense Chuck Hagel in 2014. It is a strategy to neutralize the PRC's A2/AD strategy by putting state-of-the-art weapons such as drones, unmanned submarines, and destroyers with installed rail guns to the South China Sea.

The US has dedicated increased intelligence assets to counter the PRC's military rise. Also, it is networking its military partnerships with Japan, South Korea, Australia, the Philippines, Singapore, India, and Vietnam. The US hopes to contain China by cutting off the IMF's bailout to countries participating in China's Belt and Road Initiatives(BDI). The US is planning to establish a space force by 2020 to counter China and Russia's strengthening space forces. The US space forces will be the sixth branch of US armed forces and its creation signals space hegemonic competition. The US is planning to develop hypersonic weapons by 2021 to maintain pace with peer competitors <Table 4>.

Table 4. Hypersonic missiles of the US-China-Russia.

	The US	Russia		China	
Name	x 51	Kinsale	Avangard	DF-ZF	Tarry Sky-2
Maximum speed	Mach 5.1	Mach 10	Mach 20	Mach 5-10	Mach 6
Range	Unknown	3,000Km	5,500Km	2,000-12,000Km	Unknown
Means	Unknown	Air to earth missile	ICBM	ICBM	Unknown

In tackling China's military rise, the US military posture is expected to include expanded naval forces with additional submarines and warships, including the possibility of a second forward-deployed aircraft carrier strike group. New deployments to Asia of advanced warplanes and drone

aircraft also are expected, along with regional arms sales to American allies of ships, aircraft, missiles, and drones. The US created the International Development Finance Corporation(USIDFC) which is a private-sector driven model. It is different from China's dangerous debt-trap diplomacy.

Even though the US-led liberal world order has been put under strain by the Trump administration's role in Asia, the US' engagement policy pursued by Obama has been unchanged over the fending issues of the Korean Peninsula, South China Sea, and Taiwan. < Table 5>. China considers ending "North Korea's nuclear and long-range missile programs as a worthwhile but secondary goal," while it prioritizes advancing its own geopolitical goals on the Korean Peninsula. It seeks a deal that goes further to include scaling back or ending the US-South Korea alliance and, eventually, removing US forces from the Korean Peninsula.

Table 5. Comparison of pending issues in the Indo-pacific region.

Issue	US interest	China's interest	Stability
Korean Peninsula	CVID(complete verifiable, irreversible denuclearization)	CVID+Decrease of US influence in the Korean Peninsula	High stability on account of the peace process.
South China Sea	Freedom of navigation, maritime order	Right in "the nine-dash line,"	No mechanism exists to handle the issue in a stable environment
Taiwan	Supporting peace and stability abiding by its one China policy.	Territory inevitably to be unified one day.	High stability

In tackling the DPRK's denuclearization, the US needs to accept that the regime will remain a nuclear power for the foreseeable future and map out countermeasures[19].

4.2. The US allies' response

Japan has regarded China as an offensive country since the two countries clashed in the Senkaku Islands in 2010. In the face of a rising PRC challenge, the US and Japan have strengthened their security cooperation, including participation in bilateral and multilateral exercises to improve interoperability at the tactical and operational levels. Japan is rapidly improving its defensive capabilities to counter China's military rise. The U.S. and Japan have conducted an annual bilateral military exercise of the so-called Iron Fist 2020 on January 17 involved 330 Japanese soldiers and 1,200 U.S Marines, sailors, and soldiers. India is strengthening its security cooperation with Southeast Asian countries in response to China's rise. China's entry into the Indian Ocean, which is the Indian zone of influence, has worried India. India needs to counter the Chinese ambition to encircle India in the Indian Ocean Region[20]. An Indian navy battleship has paid a visit to the Philippines. It also has executed naval operations with Vietnam in the Hai Phong region. India regards China's destruction of two Indian guard posts in the border area of its Sikkim state as a security threat. The US actively mediated between India and China and opened regular ministry-level talks to check China's military self-assertion. In the short term, India is trying to prevent a conflict with China's military but in the long term, it has two strategies. One is the pursuit of economic development instability and another is building a close cooperative network with other countries to check a rising China. Indian Prime Minister Narendra Modi outlined seven elements of India's vision for the Indo-Pacific region as follows<Table 6>.

Table 6. India's vision for the Indo-Pacific region.

India's vision for the Indo-Pacific	Indo-Pacific as a free, open and inclusive region
	ASEAN/Southeast Asia as the center
	Common rules-based order
	Equal access to the use of shared maritime and air spaces
	Connectivity

	Globalization
	Cooperation as opposed to competition

The Indian government has set up the "Look East" policy which involved joint military exercises and security agreements with Indonesia, Singapore, South Korea, Philippines, Laos, Cambodia, and Thailand[21]. Even though India is cooperating with democratic partners in the region, India also needs China for its economic development. India's perspective on China is different from the US: China's rising power has to be balanced and its assertiveness has to be countered. India has always avoided any cooperation with the US that might anger China because India is hesitant to encourage China's antagonism toward India and "encircle" it in its neighborhood.

Australia's strategic concerns with China have an impact on the level of Australian security cooperation with the US, Southeast Asian states, and ASEAN. Even though Australia is heavily dependent upon China for trade, its security alliance is with the US. The Australian strategic community relies on the strength of its alliance with the US to reduce external threats. In 2016-17, China accounted for over a third of total Australian merchandise trade, and close to a third of its exports <Table 7>[22].

Table 7. Trade with china(\$millions, 2017 figures).

	Exports	Share of total	Import	Share of total	Trade balance
Australia	76,687	33.0%	49,159	21.5%	+27,528
Brunei	271	4.0%	591	16%	-320
Cambodia	743	6.2%	5,495	32.8%	-4,752
Indonesia	22,941	13.6%	35,825	22.8%	-12,884
Laos	1,421	60.7%	1,511	39.1%	-90
Malaysia	27,356	12.6%	38,850	19.8%	-11,494
Myanmar	4,072	35.8%	5,667	33.5%	-1,592
Philippines	6,920	12.0%	16,741	18.7%	-9,821
Singapore	5,3871	14.4%	45,183	318.%	+8,833
Thailand	2,9391	12.5%	45,038	20.0%	-15,647
Vietnam	30,663	17.4%	56,981	32.7%	-2,6320

The Australian government, in the 2017 Foreign Policy White Paper, articulated an agenda for stability and peace in the Indo-Pacific. There has been increased emphasis on Australia boosting its security partnership with Indonesia, India, and Japan, as a part of strengthening its Indo-Pacific strategy.

Southeast Asian states are heavily dependent on China's economy in their trade and investment. ASEAN states which are in territorial conflict with China, especially Vietnam and the Philippines are strengthening their naval power. Simultaneously, they are putting forth an effort to enhance security cooperation with the US. The US as a power balancer in the region plays a very important role in maintaining peace and security of the region[23][24]. Vietnam which is in territorial conflict with China is taking a military posture to check China by embracing a security cooperation policy with the US. However, China's beneficiary countries like Thailand, Myanmar, and Laos, are not as guarded against China. China's dramatic build-up of its military power and the authoritarian regime is provoking fear and suspicion among its neighboring countries. The US is including Mongolia in its containment network for China and Mongolia is trying to check China with the US. China upholds the "equality of states in establishing international norms and the unfringeable sovereignty of all states, whether its methods suit Western standards or not."

South Korea is under the military influence of China as China's military rise is realized over time. China has included unilaterally the Korean island of Socotra Rock in its ADIZ in 2013, thereby opening up the possibility of a future territorial conflict with South Korea[25]. As China's military gets stronger, it may adopt an offensive military posture, which will be a colossal security threat to South Korea[26]. South Korea will pursue its long-term survival through the South Korea-US alliance system rather than stand-alone against China. China is trying to elicit South Korea to its side as ROK strategic values are increased amid the US-China hegemonic competition in the Northeast Asia region. South Korea needs to strengthen the ROK-US alliance system to defend democracy and human rights while man-

aging friendly relations with China.

5. Conclusion

A realist's perspective of the world rests on the following assumptions: the pursuit of survival, maximization of interests, and self-help. Defensive realists try to preserve power, rather than increasing it as the main goal of states[27][28]. China's self-assertion in the South China Sea has been galvanized by the survival mindset against the US containment policy toward China[29]. China's survival can be better secured by the occupation of the South China Sea to protect its sea lines of communication. China's militarization of the South China Sea and its military build-up can be illustrated as a self-help project for the maximization of its security interest in the Indo-Pacific region. In this article, I have reached the following conclusions. China's military rise is based on defensive realism, not offensive realism. The basic assumption of this paper is that the US strategy is aiming at the counterbalance of China's expansionism. First, The US response to China's expansionism is to check China's military rise as a superpower with the network of alliance-making in the Indo-Pacific region and North-east Asia. Second, China tries to build a military facility in the South China Sea to maximize its interest in terms of energy, fish, and security. Third, China's military build-up can be illustrated as self-help to meet the balance with the US formidable military might. In the Indo-Pacific region, the US tries to check China through the QUAD-PLUS.

It is an open secret that China's military rise and its self-assertion provoke fear in the neighboring countries. China is fortifying its military facilities in the South China Sea and the US is responding with freedom of navigation operations. From an offensive realism perspective, the US approach in the region with implementing a FOIP(Free and Open Indo-Pacific) and the QUAD can be instrumental in countering China. President Trump and his security advisor John Bolton have shown characteristics for offensive realists in dealing with China, unlike Henry Kissinger. The US policy on the South China Sea is mutual denial over the islands in the South China Sea. It does not agree with China's unilateral possession of the South China Sea Lanes. China is going to elicit ASEAN states to its side by tailored coercion with economic incentives. Also, China is strengthening its economic cooperation with the EU states which are in trade conflicts with the US to elicit them to its side. China's military rise will continue in the future, so the US and its allies need to establish counter- balancing networks.

The US needs an active engagement policy toward China with shared values of peace, prosperity, rule of law, and human dignity in cooperation with its democratic allies in the region. The reason for China's consolidating its governance in the South China Sea can be illustrated as the maximization of economic and security interest in the global competition with the US. China's ultimate goal may be sharing governance with the US in the Pacific Ocean. China's attempts to rise as a center in the global community with a strong military might be a means of setting up a new type of relationship with the US.

All in all, the success of the US Indo-Pacific strategy requires consistency in restoring past US security partnerships and providing clear security assurance to allies in the region. In the process, the democratic partner's cooperation to enhance human rights and the rule of laws may be sorely needed. China is trying to create a new South China Sea order via COC(code of conduct) with ASEAN by setting up bilateral relations with claimants through allegedly tailored coercion. China is going to expand its control over the South China Sea by drawing support from claimants by giving them economic benefits through trade or common development projects. Sometimes, maintaining US security partners is not always incompatible with the US-first policy.

The Trump administration's US-first policy offers a good opportunity for China's effort to decouple existing allied states with the US. China will take advantage of the situation to win in the hegemonic competition with the US in the Indo-Pacific region. For the security and peace of the Indo-Pacific region, the US and China need concessions and compromises to solve issues of territorial disputes in the South China Sea and denuclearization of the Korean Peninsula. The ROK's balanced diplomacy between the US and China is still an effective tool to elicit the DPRK's denuclearization and peace

regime building on the Korean Peninsula from the liberalist's perspectives. The ROK needs to protect and enhance its interests and to make "the best" and wisest choice for the survival and welfare of the Korean people, thereby maintaining the balance between realism and liberalism in international theory. The ROK, as a sovereign state, must maintain the status quo policy with the promotion of pragmatism based on principles of national interests from perspectives of the geopolitical-economic location of the Korean Peninsula. The ROK continues to strengthen the ROK-US alliance by defending and advocating the national interests, simultaneously maintaining a strategic partnership and cooperation with China.

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7. Appendix

7.1. Authors contribution

Initial name		Contribution
Author	SL	<ul style="list-style-type: none"> -Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/> -Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/> -Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/> -Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

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PSYCHOLOGICAL HEALTH Relation between Perception, Appearance Satisfaction, and Happiness of Women Participating in Jewelry Therapy

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Abstract

Purpose: This study was conducted in order to examine the relations among the recognition, happiness and appearance satisfaction of jewelry therapy participant women and find out which structural effect appearance satisfaction as mediation effect has on feeling of happiness.

Method: Study participants are 152 women in their 30s~ 60s purchased color jewelry at the jewelry shopping mall in Jongrogu, Republic of Korea and they were selected in a way of purposive sampling as the ones subject to the analysis of this study. Second, in order to analyze relationship which recognition and appearance satisfaction influence on the happiness, Multiple Regression Analysis is conducted. First, Structural Equation Modeling(SEM) is set in order to verify mediating effect of structural relations of each variables and appearance satisfaction variables and the assessment of model fitness and path coefficient between variables is conducted. Fifth, positive statistical analysis verifies at the $p < .05$ level.

Results: First, in examining the result of multiple regression analysis in terms of the effect of participants' recognition and appearance satisfaction to happiness, it is discovered that, to the happiness, physical recognition, social recognition, educational recognition and appearance satisfaction are statistically significant but psychological recognition is not. Second, it is discovered that appearance satisfaction works as significant mediation effect between the recognition and happiness. In other words, it is discovered that the recognition, an external variable, has a significant effect on appearance satisfaction, an internal variable.

Conclusion: Through this study, we can see that the recognition of women participating in jewelry therapy has positive effect not only on appearance satisfaction but also happiness with appearance satisfaction as mediation variable. That result of this study is significant in that it provides basic information of psychological health relations with which emotional response can be scientifically analyzed and utilized in the reality which lacks objective evaluation standard for jewelry therapy

[Keywords] Psychological Health, Perception, Appearance Satisfaction, Happiness, Jewelry Therapy

1. Introduction

Today's life requires us to continuously adapt ourselves to a variety of works and events. In this rapidly changing society, the people either encounter health problems which have not been identified in the past or sometimes face with floating situation[1][2]. In particular, a psychological reaction to the stress takes place and this reaction is closely related to health decision factor and there is a variety of factors causing emotional change including personality, emotional intensity, self-esteem, happiness, and appearance satisfaction[3][4].

If a stress accumulated due to external stimulus and changes in emotional condition continues for a long time, human body goes through a stage of resistance and reaches exhaustion, which breaks psychological stability and cause a disease[5][6]. In this way, the mind and body

are not separate and interconnected and our body can be seen as responding the same to any threat, actual or imaginary. Recently, the treat caused by stress in this pandemic situation of COVID-19 emerges commonly to all the people today[7][8]. As the people stay home much times because of restrictions on their daily life, social distancing, mask wearing rule, dissatisfaction of economic activities and fear to infectious disease, the stress to the people accelerates[9][10][11].

The one which plays positive role against negative respond of body caused by this stress is a feeling of happiness[12]. Happiness to a person refers to self-awareness and development of his or her positive character and strength and utilization of daily life to the reality, which leads a pleasant life, engaged life and meaningful life. It is known that the Happiness comes out in the course that a person makes best effort in demonstrating his or her potential from the perspective of self-actualizing[13][14].

Happiness can be examined through the subjective sense of well-being that perceives an individual's overall life. Subjective feeling of well-being is focusing on pleasure and positive emotional experiences and a happy life does not come from objective environment such as health, sense of stability, wealth and reputation but is decided based on the individual's subjective judgment on life. Subjective well-being can be composed of emotional and cognitive factors. Emotional factors include positive and negative emotions, and cognitive factors include overall life satisfaction[15][16].

In this study, it is said that appearance satisfaction set as a parameter is the one of subordinate conception of physical satisfaction and body image includes recognition of, attitude and behavior to the shape, ability and efficiency of body. In other words, it is estimated that appearance satisfaction is not only a subjective evaluation to the body but also one of important factors determining a happiness in the life of individuals[17][18]. Thus, in this study, we apply the theory of jewelry therapy in order to verify whether the mediating effect of appearance satisfaction has an impact on the relation between recognition of jewelry and happiness, psychological health of women.

In Korea, color therapy and thermotherapy including jewelry therapy are considered as a part of natural medicine and places emphasis on physical, emotional and spiritual treatment by using jewelry. This therapy is a field expanding to naturopathy[19][20]. but most of them have not been scientifically verified and passed down to oral and literature. Thus, the process of identifying the relationship between recognition and happiness of jewelry and appearance satisfaction in this study may be a chance to scientifically analyze and utilize the condition of psychological health in this reality where objective standards of evaluation of jewelry therapy lack.

2. Methods

2.1. Participant

Study participants are 152 women in their 30s~ 60s purchased color jewelry at the jewelry shopping mall in Jongrogu, Republic of Korea and they were selected in a way of purposive sampling as the ones subject to the analysis of this study. Examining their ages as general characteristic of study participants, the number of women in their 50s are 54 out of those 152 women, 35.5%, and account for most of study participants and the number of women in their 60s are 48 and account for 31.6%. 100 women out of those 152 women, 65.8%, are married and the number of ones divorced or bereaved are 30 representing 19.7%. As for their educational background, the number of the ones graduated from university and college are 89 and account for 58.6% and the ones graduated high school and below are 37 and account for 24%. As for average number of times they wear jewelry each week, the number of them wearing jewelry not more than 3 times are 56 which represents 36.8%; the number of them not more

than 4 times are 30 which represents 19.7%; and the number of them not more than twice are 24 which represents 15.8%.

2.2. Instruments

In this study, measurement tool of recognition used as independent variable was used by amending and supplementing the measure used for figuring out the recognition of naturopathy therapy of Kim & Lee[1]. The questionnaires of recognition survey are consisting of 4 factors 3 for psychological recognition, 3 for physical recognition, 3 for social recognition and 3 for educational recognition. The total explanation ability of extracted factors turns out 71.5% and it is conformed that the reliability to each factors of recognition are Cronbach's α .810, .712, .768, .786 which are recognizable.

The measurement tool of appearance satisfaction used as mediated factors is used after amending and supplementing the measurement of body esteem scale translated by Sim[21]. Appearance satisfaction factor is consisting of two areas appearance satisfaction and appearance dissatisfaction and it is discovered that the constitution between factors excluding questionnaires the factor load of which shows below .100 is good and total explanation ability is 76.6%. Cronbach's α values for these factors were found to be .844 and .732, indicating a reliable level.

The measurement tool for the happiness used as dependent variable is used by amending and supplementing the content of Psychological Well-being Scale(PWBS) which is developed by Ryff and translated into Korean version[22][23]. The questionnaires of survey of happiness are consisting of 4 factors 8 questionnaires for control over the environment, 8 questionnaires for personal growth, 7 questionnaires for life goal, and 7 questionnaires for positive personal relations. It is discovered that total explanation ability of extracted factors is 76.3% and the reliability of each factors of happiness are Cronbach's α .824, .815, .751, .723 which are recognizable.

2.3. Data analysis

In this study, 152 copies of questionnaire are used as final analysis data and the program used in this analysis use SPSS 23 statistical package. The ways of positive analysis for verifying issues of this study are as follows. First, Exploratory Factor Analysis is conducted in order to find out wither the factors of recognition, appearance satisfaction and variables of feeling of happiness is valid or not and credibility verification is analyzed by calculating coefficient of Cronbach's α . Second, Pearson correlation analysis was conducted to analyze the research direction and correlation between the variables. Third, in order to analyze relationship which recognition and appearance satisfaction influence on the happiness, multiple regression analysis is conducted. Fourth, Structural Equation Modeling(SEM) is set in order to verify mediating effect of structural relations of each variables and appearance satisfaction variables and the assessment of model fitness and path coefficient between variables is conducted. Fifth, positive statistical analysis verifies at the $p < .05$ level.

3. Results

3.1. Correlation analysis of measurement variables

The result of correlation analysis of recognition variable, appearance satisfaction variable and happiness variable of study participants women in jewelry therapy is as stated in <Table 1>. Recognition and appearance satisfaction shows mostly the positive(+) correlation and appearance dissatisfaction shows negative(-) correlation. In addition, recognition and happiness mostly show positive correlation and appearance satisfaction and appearance dissatisfaction show positive(+) correlation and negative(-) correlation with happiness, respectively, which shows that this corresponds with the direction of this study.

Table 1. Correlation analysis of measurement variables.

Division	1	2	3	4	1	2	1	2	3	4
Recognition	Psychological	1								
	Physical	.748**	1							
	Social	.319*	.025	1						
	Educational	.617**	.214**	.054	1					
Appearance satisfaction	Satisfaction	.318*	.258**	.001	.034	1				
	dissatisfaction	-.210*	-.040	-.104	-.062	-.087	1			
Happiness	Control	.194*	.014	.171*	.187*	.122	.024	1		
	Personal growth	.145	.110	.430**	.243**	.005	.149	.144*	1	
	Purpose of life	.691*	.221*	.153	.082	.194*	-.277**	.384**	.366*	1
	Human relationship	.260*	.154	.309**	.018	.261**	-.378**	.108	.136	.154

Note: *p<.05**p<.01.

3.2. Analysis of influential relation of recognition to happiness

In this study, in order to find out the influential relation which the jewelry therapy participants' recognition has on the happiness, multiple regression analysis is conducted. Dependent variable is set with happiness and independent variables are set with sub factors of recognition psychological recognition, physical recognition, social recognition and educational recognition for conducting this analysis. It is considered that there is no multicollinearity and autocorrelation because, as for regression model, variance Inflation Factor: VIF does not deviate from the thresholds and the value of Durbin-Watson shows proper level.

As for model suitability, F-value shows 5.182 and is statistically significant (p<.05) an R² which explains the feeling of happiness of each independent factors, is discovered to have 32.4% of explanation ability. In examining the result of analysis of regression model, it is discovered that physical recognition (B=.053, p<.05), social recognition (B=.051 p<.05), and educational recognition (B=.058, p<.05) are statistically significant in terms of feeling of happiness, while psychological recognition is discovered as not statistically meaningful. The following <Table 2> is the result of multiple regression analysis of happiness to recognition.

Table 2. Results of multiple regression analysis of recognition to happiness.

Dependent variable	Independent variable	B	SE	β	t	Probability of significance	F	R ²
Happiness	Constant	3.437	.108		31.729	.000	5.182	.324
	Psychological	.023	.024	.128	.950	.344		
	Physical	.053	.024	.271	2.224	.028		
	Social	.051	.023	.201	2.231	.027		

Educational	.058	.025	.188	2.266	.025
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Note: $p < .05$, Durbin-Watson=2.316.

3.3. Analysis of influential relation of recognition to appearance satisfaction

In order to figure out the influential relation of jewelry therapy participants' appearance satisfaction to their happiness, multiple regression analysis is conducted. Dependent variable is set with appearance satisfaction set as parameter and independent variables are set with sub factors of recognition psychological recognition, physical recognition, social recognition and educational recognition for conducting this analysis. It is considered that there is no multicollinearity and autocorrelation because, as for regression model, variance inflation factor: $VIF \geq 10$ does not deviate from the thresholds and the value of Durbin-Watson shows proper level. As for model suitability, F-value shows 3.083 and is statistically significant ($p < 0.5$) and R^2 , which explains the happiness of each independent factors, is discovered to have 27.7 % of explanation ability. In examining the result of analysis of regression model, it is discovered that only social recognition factor ($B = .199$, $p < .05$) are statistically significant in terms of appearance satisfaction, while other recognitions of psychological recognition, physical recognition and educational recognition are discovered as not statistically meaningful. The following <Table 3> is the result of multiple regression analysis of recognition to appearance satisfaction.

Table 3. Results of multiple regression analysis of happiness to recognition.

Dependent variable	Independent variable	B	SE	β	t	Probability of significance	F	R^2
Happiness	Constant	2.926	.159		18.348	.000	3.083	.277
	Psychological	.023	.035	.091	.656	.513		
	Physical	.060	.035	.215	1.719	.088		
	Social	.199	.051	.182	1.925	.046		
	Educational	.048	.037	.110	1.295	.198		

Note: $p < .05$, Durbin-Watson=2.198.

3.4. Analysis of influential relation of recognition and appearance satisfaction of happiness

In order to find out the influential relation which the jewelry therapy participants' recognition and appearance satisfaction have on the happiness, multiple regression analysis is conducted. Dependent variable is set with happiness and independent variables are set with appearance satisfaction level set with sub factors of recognition psychological recognition, physical recognition, social recognition and educational recognition for conducting this analysis. It is considered that there is no multicollinearity and autocorrelation because, as for regression model, variance Inflation Factor: $VIF \geq 10$ does not deviate from the thresholds and the value of Durbin-Watson shows proper level. As for model suitability, F-value shows 12.708 and is statistically significant ($p < 0.5$) and R^2 , which explains the feeling of happiness of each independent factors, is discovered to have 40.3% of explanation ability. In examining the result of analysis of regression model, it is discovered that physical recognition ($B = .031$, $p < .05$), social recognition ($B = .063$, $p < .05$), educational recognition ($B = .059$, $p < .05$) and appearance satisfaction ($B = .334$, $p < 0.5$) are statistically significant in terms of happiness, while psychological recognition is discovered as not statistically meaningful. The following <Table 4> is the result of multiple regression analysis of recognition, appearance satisfaction and happiness.

Table 4. Result of multiple regression analysis of recognition, appearance satisfaction and happiness.

Dependent variable	Independent variable	B	SE	β	t	Probability of significance	F	R ²
Happiness	Constant	4.433	.189		23.456	.000	12.708	.403
	Psychological	.015	.022	.083	.686	.494		
	Physical	.031	.022	.157	2.418	.028		
	Social	.063	.020	.251	3.099	.002		
	Educational	.059	.023	.192	2.579	.011		
	Appearance satisfaction	.334	.054	.434	6.136	.000		

Note: $p < .05$, Durbin-Watson=2.082.

3.5. Verification of suitability and analysis of mediated effect

The suitability of structural model shows the level of similarity of basically assumed covariance matrix with entered sample covariance matrix. Entered sample covariance matrix represents actually measured data and assumed one is the model. In other words, the more the two covariance matrixes match, the higher the suitability is. The model becomes the one which reflects well the reality[24]. As stated in <Table 5>, the model suitability of study model which conduct positive analysis is $\chi^2=20.214$ (d.f.=3) and the values of GFI, RMR and CFI are good($P=0.000$, GFI=0.929, AGFI=0.858, RMR=0.06, CFI=0.921, and RMSEA=0.09), which we can say that this shows acceptable model suitability.

Table 5. Suitability index of structural model.

d.f.	P-value	χ^2	GFI	AGFI	RMR	CFI	RMSEA
3	0.000	20.214	0.929	0.858	0.06	0.921	0.095

In this study, a path analysis using Structural Equation Modeling(SEM) is conducted in order to verify the mediation effect of appearance satisfaction on the recognition and happiness of women participating in jewelry therapy. For this path coefficient is assessed and statistical significance is verified for parameter estimated value. Non-standardized path coefficient cannot compare the size of path and we directly compare the size of path by using standardized path coefficient and $p < .05$ is set as the significance level based on a two-sided test. As a result of path coefficient assessment of structural model, it is discovered that the recognition is statistically meaningful to the happiness(.31) with path of appearance satisfaction(.66) as parameter.

Table 6. Results of analysis of path coefficient of structural model.

	Path	Estimate	S.E.	C.R.	P
Appearance satisfaction	<--- Perception	.66	.039	21.683	.022
Happiness	<--- Appearance satisfaction	.31	.054	13.865	***

Happiness	<---	Perception	.73	.026	20.381	.017
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The result of path coefficient analysis of structural model is analyzed as stated in <Table 6>. In specifically examining the estimate and value of path coefficient under maximum-likelihood between each variables, it is discovered that the recognition of external variable has significant impact on appearance satisfaction, an internal variables(.66, CR=21.683, p<.022). And, even in the relation between appearance satisfaction and happiness, internal variables, it is discovered that appearance satisfaction has significant effect on happiness(.31, CR=13.865, p<.001). In addition, even in direct relation between recognition and feeling of happiness, it is discovered that the recognition shows significant path(.73, CR=20.381, p<.017).

4. Conclusion and Recommendations

This study was conducted in order to examine the relations among the recognition, feeling of happiness and appearance satisfaction of jewelry therapy participant women and find out which structural effect appearance satisfaction as mediation effect has on feeling of happiness. In examining the result of study on the relations among the recognition, feeling of happiness and appearance satisfaction of women participating in jewelry therapy, it can be summarized and outlined as follows

First, in the multiple regression analysis, where the dependent variable was set as happiness and the sub-factors of recognition, psychological, physical, social, and educational, as independent variables, physical, social, and educational perceptions were statistically significant. But the psychological perception was not statistically significant. From this result of analysis, we can see that the recognition of physical health, effect of disease treatment, formation of social relationship and personal relations, and educational value of jewelry color therapy has positive effect on feeling of happiness.

Meanwhile, in the multiple regression analysis that sets dependent factor of appearance satisfaction as mediation variable and sub-factors psychological, physical, social and educational recognition as independent variables, it is discovered that only social recognition is statistically significant. From this result of analysis, we can see that, even if various factors work to appearance satisfaction, formation of new social relationship, positive thought, and smooth personal relationship, which appear when the participant women wear jewelry, show positive effect.

In examining the result of multiple regression analysis in terms of the effect of participants' recognition and appearance satisfaction of happiness, it is discovered that, to the happiness, physical, social, educational recognition and appearance satisfaction are statistically significant but psychological recognition is not. This study result is discovered as similar to the result of other studies finding that self-esteem, extroversion, optimism and positive personal relationship are variables which are the best predictors of happiness in the relations between psychological traits and happiness of an individual[25][26][27].

Second, it is discovered that appearance satisfaction works as significant mediation effect between the recognition and happiness. In other words, it is discovered that the recognition, an external variable, has a significant effect on appearance satisfaction, an internal variable. Even in the relation between appearance satisfaction and happiness, internal variables, it is discovered that appearance satisfaction has a significant effect on happiness. In addition, it is discovered that the improvement of recognition works direct factor in happiness and represents significant path and we can see that this improvement of recognition has an effect on happiness.

In the end, it is discovered that improved recognition of jewelry therapy participants has positive effect on multi-dimensional of happiness through appearance satisfaction, a mediation variable, even though that improved recognition has a direct effect on happiness. This

result of this study is consistent to other studies verifying that women's appearance satisfaction has positive effect on happiness, which supports the result of this study that the mediation effect of appearance satisfaction on happiness is positive[28][29][30].

Jewelry therapy in these days is deemed as a part of alternative therapy and places emphasis on emotional treatment while it has not been scientifically verified and has been passed down mainly to the literature. Therefore, this study focused on the theory of recognition of jewels, examined the relationship between appearance satisfaction on happiness, and presented the basic foundation of jewel therapy theory. In Korea, studies which have been scientifically verified lack. Thus, it is considered that the studies in the future will need research and development of programs which can utilize jewelry therapy as a program of health mediation.

Considering that happiness is the most important value and the final goal of people's life, from the result of this study on jewelry therapy, it is discovered that the changes in recognition of appearance and beauty may enhance psychological health of individuals and the possibility of utilization as natural therapy to disease treatment related to stress is confirmed.

Through this study, we can see that the recognition of women participating in jewelry therapy has positive effect not only on appearance satisfaction but also happiness with appearance satisfaction as mediation variable. That result of this study is significant in that it provides basic information of psychological health relations with which emotional response can be scientifically analyzed and utilized in the reality which lacks objective evaluation standard for jewelry therapy.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	CL	-Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/>
Corresponding Author*	JL	-Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/>
Co-Author	EN	-Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/> -Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

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Policy Tasks to PROTECT and Foster Korean Traditional Markets

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Abstract

Purpose: This study reviewed the facility modernization support project and the market management innovation support project that the Korean government has been promoting to vitalize the traditional market. Based on this, the achievements and limitations of the traditional market protection and promotion were investigated, and based on the market status analysis, a policy task proposal was attempted to foster the traditional market.

Method: This study aimed to find out what direction the countermeasure strategy should take to protect and foster Korea's traditional market. In order to achieve this research objective, first, data of the online research reports of Korea Research Institute for Local Administration(KRILA) was reviewed, and statistical data of the Small Enterprise and Market Service(SEMAS) related to the Korean traditional market was collected to confirm the current policy process.

Results: First, study proposed reinforcing urban regeneration strategy and integration frame, strengthening cooperation with large retailers and promoting regional growth strategies, etc. as a policy task to foster traditional markets. Reinforcement of urban regeneration strategies and integrated frames incorporates urban development strategies and place-centered strategies of traditional markets to foster regional integration that establishes identity, diverse economic and cultural spaces as the center of the local community. Second, The promotion of regional customized growth strategies proposed the construction of continuous growth strategies considering the unique characteristics of traditional markets depending on their location or conditions.

Conclusion: The protection and fostering of traditional markets shall be promoted in an integrated aspect of regional development on the basis of clearly establishing policy goals for enhancing competitiveness. In the case of policies that restrict the consumer class to simply residents within local governments, the competitiveness of traditional markets can be reduced and the chances of survival can be threatened. Therefore, sustainable development will be guaranteed when policies are established to absorb potential consumers through cooperation between urban development and the distribution economy.

[Keywords] Policy Tasks, Protect, Foster, Traditional Market, Continuous Growth Strategies

1. Introduction

The meaning of traditional Korean markets is represented as a support for the local economy and a place of life that contains local culture. Various cheap and high-quality items, such as household goods, industrial goods, and foods, have played a role as a living space for petit bourgeois and a central space for wholesale and retail distribution[1][2]. Therefore, traditional markets have been used as an indicator that influences the direction of the people's sentiment and the economy of the common people, and it is represented as the domain of the common people[3][4].

However, after the opening of the distribution market in 1996, the business environment of the traditional market began to deteriorate due to the local expansion of domestic and overseas large retailers and the emergence of various distribution businesses such as corporate supermarkets, department stores, and convenience stores[5]. Moreover, the fear of infectious diseases caused by the pandemic of COVID-19 has resulted in limitations in daily life, and social distancing has been strengthened, reducing external activities, leading to a major change in lifestyle[6][7][8]. Therefore, the consumer's purchasing pattern has rapidly changed to online purchase and home shopping through the Internet, and the Korean traditional market is threatened and its decline is accelerating.

The cause of the traditional market's stagnation can be identified from various aspects, but it is diagnosed as the fact that the economy of scale logic is becoming more common in the distribution industry due to increased competition due to deepening globalization and digitalization[9]. In addition, the development of the Internet is increasing the proportion of consumers sharing distribution information, and in the e-commerce market, it is becoming possible to realize customer satisfaction through consumer feedback and communication[10].

Changes in consumption patterns can be summarized as the emergence of various distribution types, shortening the cycle of change in consumption trends, polarization and high-end, expansion of online shopping, acceleration of changes in business types, and intensification of oligopoly by business type. Moreover, the recent growth of online platforms and factors such as COVID-19 are driving this trend more rapidly[11][12]. Eventually, such changes in the distribution environment and the diversification and polarization of the distribution industry act as a factor that lowers the rate of consumer participation in the traditional market and hinders the market value of the traditional market[13][14].

Traditional markets, which are weak in competitiveness, have become difficult to survive due to the development of the distribution industry, and conflicts with retail conglomerates have led to social problems. Accordingly, the Korean government implemented policy promotion measures for traditional markets, taking into account the stability of the livelihood of the common people, protection of the local economy base, the effects of the front and rear economy, and the role of local cultural resources. At the beginning of the support in 2002, the facility modernization project was focused on, and management innovation projects were added after 2005, and a budget of more than 4 trillion won was put into the traditional market activation policy until 2019[15].

However, despite the continued support from the Korean government, the traditional market continues to stagnate. The sales of the traditional market, which was about 40 trillion won in 2001, is estimated at 24 trillion won in 2018. Like this, even though the Korean government has invested enormous budgets to revive the traditional market, it is not producing the expected effect[16][17]. Several prior studies on this problem have presented problems with the way to foster traditional markets. Although the Korean government's support for the traditional market contributed to supplementing basic capabilities with an emphasis on facility modernization and management modernization, it is diagnosed as insufficient to nurture self-sustainability.

Therefore, this study confirmed the negative results of the Korean government's support policy, and proceeded with recognition of this issue. This study reviewed the facility modernization support project and the market management innovation support project that the Korean government has been promoting to vitalize the traditional market. Based on this, the achievements and limitations of the traditional market protection and promotion were investigated, and based on the market status analysis, a policy task proposal was attempted to foster the traditional market.

2. Methods

This study aimed to find out what direction the countermeasure strategy should take to protect and foster Korea's traditional market. In order to achieve this research objective, first, data of the online research reports of Korea Research Institute for Local Administration(KRILA) was reviewed, and statistical data of the Small Enterprise and Market Service(SEMAS) related to the Korean traditional market was collected to confirm the current policy process. In addition, a deductive methodology was used to identify the academic research materials related to the traditional market provided by Korea Education & Research Information Service(KERIS), organize the contents judged to be in line with the contents of this study, and derive the traditional market promotion policy task.

3. Current status and Role of Korean Traditional Market Operation

3.1. Significance of traditional markets

In the process of In general, the Korean traditional market refers to a permanent or regular market that is naturally occurring in a certain area over a long period of time. These traditional markets are defined in official legal terms. In other words, a traditional market, defined in the relevant law, is a place created naturally or by social and economic needs in accordance with Article 2(1) of the Special Act for the Development of Traditional Markets and Stores, and where the transaction of goods or services is mainly conducted in a traditional way based on mutual trust.

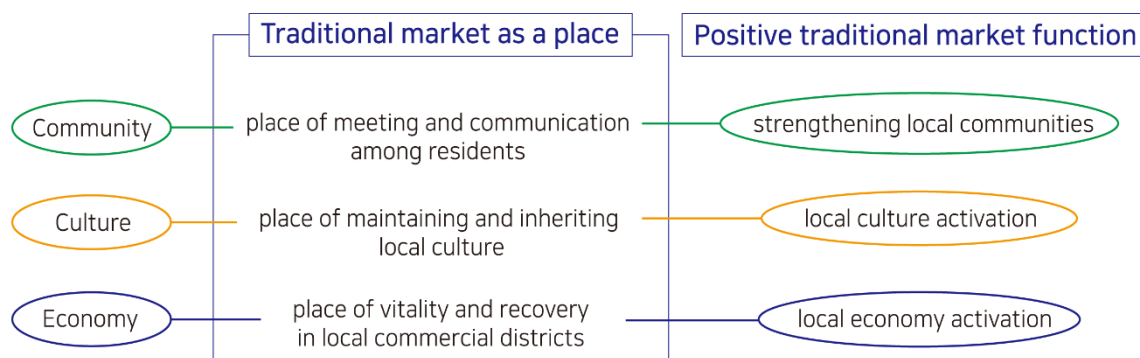
Meanwhile, the traditional market is also referred to as a locational concept meaning a place. This is because the traditional market is a place that provides a sense of dynamism and intimacy, allowing users to feel familiar, not simply as a space, but as a place that contains meaning. In addition, a place referred to here means not only a limited space due to the physical environment, but a concrete space in which the culture, lifestyle, and behavior dissolved in it are organically combined[18][19].

Traditional markets have been relatively less competitive due to their low adaptability to changes in consumption culture and purchasing patterns, but they have sufficient value as a distribution place with a unique culture to improve management and promote modernization of commerce. This is because the current appearance of traditional markets, which used to serve as a central commercial foundation for the region, is still an important grassroots area for the local economy and a living area of the common economy[20][21].

3.2. Role of traditional markets

Traditional markets have played various non-economic roles in local communities in addition to product distribution functions such as supply of daily necessities in the lives of local residents. In other words, the traditional market is being used as a place for meeting and communication among residents, a place for maintaining and inheriting local culture, and a place for restoring vitality of local business districts[22]. Traditional markets are a key place in the local community, a measure that shows the lives of common people as they are, and plays a pivotal role in the local economy. In addition to that, traditional markets also provided sights and experiences to the lives of common people as a place of social function and culture in which public opinion is formed. This role has ultimately been fulfilled by strengthening the local community, forming a local culture, and revitalizing the local economy, due to the locational characteristics closest to the local residents. <Figure 1> explains the role of the traditional market.

Figure 1. Role of traditional markets[9][20].



3.3. Analysis of traditional markets

As the last step, The number of traditional markets in Korea was 1,437 in 2018, and by size of the market, 64.1% were 'small market' with less than 100 stores, and 'medium-sized market' with fewer than 500 stores 32.3%. In terms of type of market ownership, 50.6% of the naturally generated 'common market', 26% of the 'corporate market', and 21% of the 'public market' directly managed by local governments. As for the opening cycle, the 'permanent market' represents 7.1%, the 'permanent and regular markets' 19.3%, and the 'regular market' 9.5%, respectively. The number of traditional markets decreased by 13 compared to 17 years, and in terms of the market size, the number of medium-sized markets decreased by 16. In terms of type of market ownership, the number of common markets decreased by 80 and public markets decreased by 11. In terms of the opening cycle, the number of regular markets decreased by 26 and permanent markets decreased by five[23].

Table 1. Number of traditional markets: small enterprise and market service(SEMAS).

Factor		2016		2017		2018		Change in number
		Number	(%)	Number	(%)	Number	(%)	
Total		1,441	100.0	1,450	100.0	1,437	100.0	-13
Size of market	Large	20	1.4	22	1.5	21	1.5	-1
	Medium-large	35	2.4	33	2.3	31	2.2	-2
	Medium	455	31.6	480	33.1	464	32.3	-16
	Small	931	64.6	915	63.1	921	64.1	+6
Type of market ownership	Corporate market	305	21.2	305	21.0	374	26.0	+69
	Individual market	11	0.8	25	1.7	34	2.4	+9
	Public market	321	22.3	313	21.6	302	21.0	-11

	Common market	804	55.8	807	55.7	727	50.6	-80
Opening cycle	Permanent	1,007	69.9	1,027	70.8	1,022	71.1	-5
	Regular	174	12.1	163	11.2	137	9.5	-26
	Permanent and regular	260	18.0	260	17.9	278	19.3	+18

As of 2018, the total number of market workers(including street vendors) in the traditional market was 359,049, down 4,611 from 2017(363,660). The number of 'store merchants' was 184,412(51.4%), down 0.9% from 52.3% in 2017, and the number of 'employees' in the market was 130,665, down 0.2% from 2017. Meanwhile, the number of 'street vendors' was 43,972 in 2018, an increase of 1.1% compared to 2017[23].

Table 2. Number of traditional market workers: small enterprise and market service(SEMAS).

Factor	2016		2017		2018			Change in %
	Number	%	Number	% (A)	Number	% (B)	% (B-A)	
Total of market workers	368,930	100.0	363,660	100.0	359,049	100.0	-	-1.3
Store merchants	188,774	51.2	190,286	52.3	184,412	51.4	-0.9	-3.1
Employee	139,535	37.8	133,149	36.6	130,665	36.4	-0.2	-1.9
Street vendor	40,621	11.0	40,225	11.1	43,972	12.2	1.1	9.3

4. Achievements and Limitations of Korean Traditional Market Promotion Policy

4.1. Achievements of Korean traditional market promotion policy

The support project for the protection of traditional Korean markets began with the Market Act of 1961 and the Wholesale and Retail Promotion Act of 1986. Since then, practical and specific support policies have been promoted since the enactment of the Special Measures Act to improve the structure of SMEs and revitalize traditional markets in January 2002. In this law, the subject of regulation was clarified as the traditional market, and based on this, environmental improvement projects in the traditional market began to be actively promoted. In particular, based on the law, 99 markets were selected nationwide for the first time, and it began working to support market revitalization centered on facility modernization projects with a budget of 41.3 billion won. Since then, the Special Act on the Development of Traditional Markets with their own names in 2005 and the Special Act for Traditional Markets and Shopping Districts in 2006 have been enacted to provide an opportunity for management innova-

tion projects to begin. From the enactment of the Special Act on the Development of Traditional Markets and Shopping Districts in 2009, the term of traditional markets was used as a legal term instead of traditional market terms, and the project to support facility modernization and management innovation began in earnest[24][25].

This facility modernization support project is designed to revitalize commercial districts by increasing customers and sales through environmental improvement and facility modernization in traditional markets. This project was carried out with hardware-oriented efforts to improve the convenience of purchases for customers and to maintain facilities in the old traditional markets so that they can come back in the early stage of support. It facilitated customer access, such as parking lots, access roads, arcades, etc., supported modernization of facilities such as facilities renovation. After 2004, it also provided software support measures such as merchant education, joint marketing, and gift card issuance[17].

The market management innovation support project aims to increase customer and sales by supporting management innovation in the traditional market, and to promote the revitalization of commercial districts. The main projects have been promoted from 2010 through the implementation of the cultural tourism-type market promotion plan to enhance the practical competitiveness of the traditional market. The cultural tourism-type market support project was used as a major promotion strategy as a project to promote management innovation of the market by combining tourism resources such as local culture, historical resources, and local food. In this regard, the Act on Special Measures for Supporting Small Businesses and Small Business Owners in 2013 and the Act on Promotion of Traditional Markets and Shopping Districts provided legal grounds for fostering cultural tourism-type markets and managing and operating Onnuri gift cards[12].

From 2015, the cultural tourism-type market support project was promoted as a market specialization promotion project by combining the global luxury market and alley-type market. The market specialization promotion project was promoted with a vision of fostering a differentiated specialized market that can compete with hypermarkets, strengthening the basic competitiveness of the market and providing customer-oriented services with the goal of annual sales and customer growth of 10% or more. Since then, it has been supporting start-ups for young merchants, including the creation of youth malls, and recently, there have been more support projects for fostering traditional markets where ICT is fused to boost store commercial vitality. Since then, it has been supporting start-ups for young merchants, including the creation of youth malls, and recently, there have been more support projects for fostering traditional markets where ICT is fused to boost store commercial vitality. For example, the 2019 project has been implemented for young unemployed people, including market management innovation education, consulting support, market specialization projects, and the creation of youth malls, etc[9][10].

4.2. Limitations of Korean traditional market promotion policy

Among The Korean government's traditional market support project can be divided into a facility modernization support project and a market management innovation support project, starting with 23.1 billion won in 2002 and 538 billion won in 2019, increasing the annual budget. In the early days, traditional market support projects had a high proportion of facilities modernization projects that modernize outdated market facilities. Since then, in accordance with the criticism on the effectiveness of the business, the proportion of market management innovation projects has been raised to the level of 15% in order to increase the competitiveness of the traditional market from 2004. This support stance continues to this day, and the proportion of facility modernization project expenses in 2011 continued to decline from 80% which accordingly, as of 2019, the facility modernization support project was 49.6%, and the market management innovation support project accounted for 50.4%[17].

Despite such policy supports, the achievements to foster traditional markets can be said to be negative. According to the current status of the traditional market introduced above, the

number of traditional markets, stores, and workers have been decreasing over the past three years. In other words, despite the government's continuous support projects, the overall traditional market stagnation continues. Looking at the sales trend of the distribution business that is in a competitive relationship with the traditional market, the total retail market sales in 2018 amounted to 217.6 trillion won, of which 11.0% of the sales in the traditional market was represented[23]. Sales in the traditional market for the past three years have increased slightly, but as the online market has grown significantly, the proportion of sales in the offline market has rather decreased.

Also, according to the data of Small Enterprise and Market Service(SEMAS), the sales of traditional markets fell from about 40 trillion won in 2001 to 24.9 trillion won in 2006, 19.9 trillion won in 2013, and 23.9 trillion won in 2018, even though the Korean government invested a huge budget of over 4 trillion won to support the traditional market from 2002 to 2019. This shows that although sales have been increasing little by little since 2014, they are showing less than 2006 sales levels[23]. This was part of a positive role in which laws and systems related to fostering traditional markets that were in danger of survival in a state of weak competitiveness due to the emergence of modern distribution institutions along with changes in consumption trends were reorganized, and a large amount of support budget was invested. However, there are limitations that cannot be considered to be effective enough to foster traditional markets.

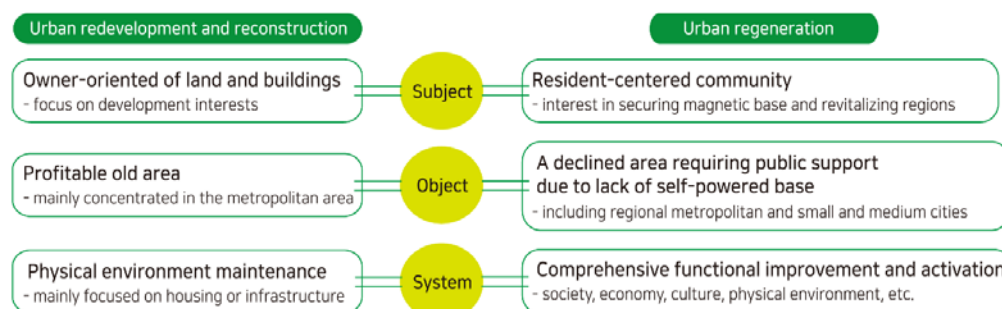
5. Policy Tasks to Foster Korean Traditional Markets

5.1. Reinforce urban regeneration strategy and integration frame

The basic direction of the policy task for fostering the traditional market is to prepare a regional integrated strategy. In the meantime, support measures that take advantage of the characteristics of traditional markets have been recognized as targets to cultivate and preserve traditional markets, and have been promoted separately from sustainable growth strategies for regional development. Therefore, regional integrated measures should be promoted to promote effective promotion policies. Second, revitalizing the local economy. Traditional markets have a positive effect on revitalizing the local economy by selling locally produced products and providing jobs to local residents. Therefore, it is necessary to seek an activation plan that can sufficiently secure the locality and product potential of the traditional market.

Urban regeneration refers to the reorganization of the urban environment in a complex dimension that considers social and economic aspects in addition to the physical environment maintenance that has continued from the past. It is necessary to apply this concept of urban regeneration to traditional markets where physical diversity, diversity of purposes, and diversity of user classes can appear, thereby establishing an urban regeneration strategy and an integrated frame based on the traditional market[26]. <Figure 2> shows the urban regeneration strategy and reinforcement of the integrated frame.

Figure 2. Urban regeneration strategy and reinforcement of the integrated frame[26].



Urban regeneration is changing its paradigm with the focus on small businesses led by the region, and the focus is on revitalizing resident-oriented local communities, and improving and revitalizing comprehensive functions such as social, economic, cultural, and physical environments targeting declining areas that need public support. Therefore, it is necessary to seek ways to expand customers other than existing consumers by reinforcing urban regeneration strategies and integrated frames to escape the vicious circle that focuses on improving the appearance of the traditional market, which does not attract the attention of consumers even if the problem is improved[27][28].

5.2. Strengthen cooperation with large retailers and promote regional growth strategies

In Korea, after the opening of the distribution market in 1996, traditional markets have continued to decline, while hypermarkets and Super Supermarkets(SSM) have grown dramatically, which has a positive effect on the overall distribution industry. Accordingly, in 2015, related laws and regulations were partially revised to limit business hours for hypermarkets, and mandatory holidays were designated. However, contrary to the expectation that the traditional market can be saved through regulation, sales of the traditional market have not increased significantly[29].

Therefore, it is necessary to devise a plan for win-win cooperation under the realistic recognition that traditional markets and large retailers are fundamentally in a competitive relationship. In other words, to solve the problem of traditional market decline, it is necessary to derive mutually beneficial measures, not competition between traditional markets and large retailers, and to create a sustainable model of shared growth. Moreover, as the online distribution industry is showing rapid growth in accordance with the COVID-19 situation, it is necessary to shift the strategic paradigm that traditional markets and hypermarkets can grow together. Win-win cooperation for shared growth can be typified by joint development of commercial districts, item differentiation, convenience and infrastructure support, promotional support, funding, education and consulting support, and community contribution activities, and joint development between traditional markets and large retailers will be possible considering the local situation and economy revitalization status[30].

Although the Korean government's traditional market support project has greatly improved the physical environment, it reveals its limitations in attracting people's interest. Since traditional markets are very diverse in location and conditions, a fostering measures that considers the unique characteristics of the market is required. It is necessary to change so that the activation policies can be concentrated centering on the traditional markets representing each region, away from what has been supported in terms of regional arrangements[22]. To this end, we need to formulate a framework for continuous growth strategy by segmenting the market based on market type and size, age of visitors, etc., selecting a target market, developing core products and services suitable for this, and establishing a positioning marketing strategy to increase brand value.

The regional customized growth strategy is to secure competitiveness by creating a unique market environment for traditional markets, and should be promoted in a way that combines elements of space, experience, and product. Taking Korea's strategy for the growth of Jeju-do's traditional market as an example, in terms of space, a store design that combines the images of Jeju-do and the traditional market is constructed to create a market space. In the experiential aspect, it is plan to various cultural contents of traditional markets to provide opportunities for cultural experiences that other retailers cannot provide. In terms of product planning, if special items are designated for each traditional market in Jeju-do and merchants develop them as star products, a market-specific brand can be formed[31]. In addition, traditional market merchants should also make efforts to adapt to the changed distribution environment, such as convergence with young merchants, by utilizing various promotional methods to secure potential customers, such as strengthening SNS and mobile advertisements.

6. Conclusion and Recommendations

The second In this study, we analyzed the current status of the Korean traditional market, examined the fostering policies that have been pursued, and discussed the achievements and limitations of policies based on actual supported budgets and increased sales data. The Korean government has been pursuing facility modernization project as a hardware support, and market management innovation support project as a software support, but the impact on sales growth and market revitalization evaluated to be insufficient. Survey and interview with merchants in the traditional market in Cheongju that actually carried out government support projects from 2015 to 2018, suggested that overall the performance of government support measures was far below the target[30].The traditional market promotion policy reveals its limitations in terms of uniform facility improvement centered on infrastructure, supporting traditional market units, lagging business methods of merchants, and intensification of dependence on the government in accordance with the uniform policy promotion[17][32].

Therefore, this study proposed reinforcing urban regeneration strategy and integration frame, strengthening cooperation with large retailers and promoting regional growth strategies, etc. as a policy task to foster traditional markets. Reinforcement of urban regeneration strategies and integrated frames incorporates urban development strategies and place-centered strategies of traditional markets to foster regional integration that establishes identity, diverse economic and cultural spaces as the center of the local community. Strengthening win-win cooperation with large retailers emphasized the transition and contents of strategic paradigms to grow with traditional markets. The promotion of regional customized growth strategies proposed the construction of continuous growth strategies considering the unique characteristics of traditional markets depending on their location or conditions.

The protection and fostering of traditional markets shall be promoted in an integrated aspect of regional development on the basis of clearly establishing policy goals for enhancing competitiveness. In the case of policies that restrict the consumer class to simply residents within local governments, the competitiveness of traditional markets can be reduced and the chances of survival can be threatened. Therefore, sustainable development will be guaranteed when policies are established to absorb potential consumers through cooperation between urban development and the distribution economy. Since this study is a paper that proposed policy tasks through traditional market-related literature and statistical data, further studies to analyze sophisticated policy effects through in-depth empirical analysis should be continued.

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8. Appendix

8.1. Authors contribution

	Initial name	Contribution
Lead Author	JO	<ul style="list-style-type: none"> -Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/> -Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/>
Corresponding Author*	JL	<ul style="list-style-type: none"> -Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/> -Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

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Color Reproduction with Drag Queen and Makeup PROTECTION

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Abstract

Purpose: Humans have a culture of decorating themselves for a long time. The Egyptians, with the oldest makeup history, protected their bodies with makeup, as you can see through the theory of Protective rumor. Also became a means of expressing beauty, and gradually became a makeup for women.

As the gender role of modern society has changed, not only women but also men are creating a culture of beauty through various media. Among them, we investigated the culture and makeup characteristics of drag queens.

Method: Reinterpreted drag queen makeup using images and psychology shown in colors. The study of drag queens is as follows. First, organize the concept of drag queens. It identifies and organizes aesthetic characteristics of drag queens. Second, images are organized according to the concepts of color and color body. Third, we reinterpret the makeup by selecting the characteristics of drag queen makeup and the resulting color image. This method was analyzed through a prior study focusing on drag queens.

Results: Work 1 is expressed with pink color as a base to maximize femininity on the male face with exaggeration. In work 2, a wig was used to express the humorousness with kitsch, and red color was used as the base.

Artwork 3 expresses splendor with a gold color as a base to express splendor with imitative nature. Overall, the makeup was performed by a man as a model, and expressed feelings such as exaggerated femininity and protective instincts to suit the characteristics of Drag Queen.

Conclusion: In modern times, cremation is an act of representing individual identity and community identity. Also, makeup is being used in various ways, such as protecting the skin or covering problem skin.

Looking at the drag queen makeup, it is necessary to maximize the feminine beauty through the male face, so the makeup method can damage the skin, so the skin was protected as much as possible and makeup was performed, and femininity was expressed with colors.

[Keywords] Drag, Drag Queen, Makeup, Makeup Protection, Color Reproduction

1. Introduction

In modern times, women's participation in society is increasing[1] and gender perceptions and stereotypes about gender roles are changing. With the development of the information society through the Internet and the change of the times[2], makeup for men, not women, has also appeared, and the standard of living[3] is changing. Men's basic products and color cosmetics have been released. Men also became interested in beauty and fashion, and various men's aesthetic cultural codes such as metrosexual, cross-sexual, and uber-sexual are emerging[4].

The purpose of make-up is to complement the shortcomings, highlight the merits, protect the skin, and express visual beauty through changes in appearance and appearance by color tone. Nowadays, makeup is sometimes done to protect the skin from fine dust and to protect

damaged skin. Among these makeups, the drag queen depicts a man in feminine outfits and makeup, and the concept of a real drag queen appearing every season has become more and more popular due to the drag queen TV show 'RuPaul's Drag Race', which premiered in 2009. Participate in a survival contest.

Drag Queen has been active in a variety of media, starting with bars and gay club shows, music videos, musicals, fashion shoots and more. Recently, they have diversified their activities without attracting attention only on social media and YouTube makeup tutorials[5]. As a result, public interest is gradually increasing and it is becoming a part of popular culture. However, little research has been done on the culture and beauty of the drag queen. Therefore, in this study, the concept, aesthetic characteristics, and composition of the drag queen are analyzed and colors are selected according to the characteristics.

2. Drag Queen

The term 'drag queen' describes men that dress up exaggeratedly as women in business or event venues[7]. Historically[8], before the 19th century, in Shakespeare plays, women could not be on stage. So, for female roles, a man dressed up as a woman performed on stage[6]. In other words, it implied maintaining one's gender identity but performing on stage characterized as a woman. In addition, in a male-centered society, actors dressed as women mainly played subordinate roles in low-level comedies, which defixed the idea of drag as a 'culture that caricatures women'[9].

Currently, ordinary men also perform as drag queens, although a lot of performers are homosexual men. They wear women's clothes and make-up with the purpose of performing and acting exaggeratedly. They can be divided into those who perform as drag queens as professionals and those who dress as drag queens as one-time entertainment in a festival[10].

Drag queens perform a drag show for the audience. The act is mainly based on lip sync. In the early days, in the United States, drag queens sang directly together with a band. However, after World War II, with the advent of political conservatism and a period of economic decline, clubs faced problems and it was difficult to hire bands. These issues led to the beginning of lip syncing and the use of recordings instead of live music, which made operation inexpensive and led to its spread all over the world[11].

Drag queens began to attract public attention during the vogue movement, a dance style that imitates the movements of upper class and Hollywood stars with arrogant and exaggerated expressions that grew at the Hispanic Drag Ball held in Harlem Street in New York since the 1950s and attracted media attention. A representative performance is the Wigstock Festival, an annual event that was started in New York City in 1984 by Lady Bunny(1962-)[12].

Social perceptions about sex changed gradually, but in a political situation that suppressed LGBTQI+, drag queens' performances became important in the gay and LGBT culture, and also became a culture of resistance[13].

Drag queens became progressively more famous with the drag queen TV show 'RuPaul's Drag Race', which started in 2009. It is a survival-style TV program where they compete with their own personality in categories such as lip sync, dance and acting, and with the appearance of Kim Chi, the first Korean among them, drag queens became popular in Korea as well[9].

3. Drag Queen's Aesthetic Characteristics

Among the aesthetic characteristics of Drag Queen are makeup and fashion. Makeup plays a beautiful role in expressing outward beauty by harmonizing the inner and outer parts of oneself[14]. Drag queens express not only through the clothes of the opposite sex, but also through the use of their body as a source of pleasure and attractiveness[12]. Looking at pre-

vious studies on the characteristics of drag queens, in Kan Hoseop's study(2000)[16], the characteristics of drag queen costumes were divided into gender identity, imitation, playability and commerciality. In Yang Sook-hee's and Jeong Se-hee's study(2004)[12], drag queens were divided into typicality, imitation, kitsch, contradiction and commerciality according to the characteristics of their fashion[6]. In this study, makeup was divided into imitation, sensuality, kitsch and commerciality as the formative characteristics of pop art. In Lee Ja-kyung's study (2010)[7], the characteristics of drag queens were classified into typicality, exaggeration and showiness through the movie *The Adventures of Priscilla*.




Based on this, the present study classified drag queens as exaggeration, kitsch, and imitateness, and analyzed the make-up of the Korean drag queen Kim Chi among the participants of the TV show 'RuPaul's Drag Race' and organized the pictures in <Table 1>.

First, regarding exaggeration, they show excessive eye make-up, arched eyebrows, lip make-up and hairstyles to express a feminine appearance as opposed to a male one. Pink color is generally used for femininity, while accessories give a flamboyant style. In Figure 1, makeup, arched eyebrows, rich eyelashes, and blue-colored shadow are used, and pink glitter gives a highlight to the eye makeup. The lips are burgundy, and the lip line is expressed as an over lip.

Second, kitsch is expressed through childishness, eroticism, humor and exaggeration, giving fun to the public through low-end clothing, accessories, and hairstyles[12]. Make-up in Figure 2 shows arched eyebrows, red eyeshadow and blusher and over lip.

Third, imitation is replicating the style of a celebrity or a star and in Figure 3 make-up consists of arched eyebrows, brown shadow and white glitter, and the lips were expressed with exaggerated eye line and peach tone glitter.

Table 1. Drag queen makeup features.

Classification	Exaggeration	Kitsch	Imitation
Characteristics	Exaggerated femininity	Humorous, erotic and lowly style	Imitation of the style of celebrities
Make-up	Arched eyebrows, rich eyelashes, and blue shadow, burgundy overlip and pointy lips with pink glitter	Arched eyebrows, red eyeshadow, red blusher and overlip	Arched eyebrows, brown shadow and white glitter, exaggerated eyeline and peach glitter for lips
Image			
	A	B	C

Note: A. <https://www.pinterest.co.kr>.
 B. <https://www.picbum.com>.
 C. <https://www.pinterest.co.kr>.

4. Color Reproduction

The basic properties of colors, which can be the basis for feeling and judging various sensibilities of colors, are three independent attributes of colors, including color, light, and saturation[17]. Regarding color, the one produced by the dispersion of sunlight into the colors of the spectrum is called light source color. Color is not directly emitted by the object but by the reflection of light[18]. In addition, color can be identified as red, green, blue, etc. according to

the visual response to the wavelength of light, and it has physical properties such as brightness, saturation, and tone[19].

Color is a phenomenon that occurs when the eye is stimulated by the light on an object and that is perceived as color when it reaches the eye and is transmitted to the cranial nerves through the optic nerves[20]. These colors have an implied symbolic meaning and psychological properties[21].

Red is a symbol of life and rebellion; it is a violent color that represents passion, danger and revolution. It also has an effect of excitement and agitation[18].

Orange gives an image of health, youth, passion and sociability, and it also evokes a warm, intimate and feminine elegance[22].

Pink is the color of a soft, shy and feminine image. It represents nobility and intimacy, and is widely used for party, engagement, and wedding make-up[23].

Yellow gives a cheerful and warm image and symbolizes the sun, light and gold. However, if it is overdone, it becomes boring and cliched, so it is better to use it in various tones[21].

Green is a neutral color and the calmest of all. It transmits the idea of health, freshness, youth, vitality, and safety. It has different tones, such as light green, which gives a calm atmosphere; vivid green, which transmit excitement and activity; and dark green, which gives a calm feeling[24].

Blue symbolizes the sky and water. It has the effect of brightening the mood, and is reminiscent of the sea, giving a feeling of clarity, trust and neatness[25].

Purple is a noble and sublime color that symbolizes elegance and nobility, but it also represents frenzy, confusion, and disease[18].

White is the color of peace and also represents emptiness and lightness. Due to its lack of saturation, it symbolizes purity, cleanliness, simplicity, etc., but also transmits boredom. White by itself it symbolizes purity and innocence in Western cultures, but also means death, sickness, and is related to funerals in China, Japan, and Korea[21].

Black represents darkness. Black is dark and represents fear, sadness, and death[26]. Also has a controlling, pressing, solemn and profound nature. In the West, black means sadness, depression, and death[27].

5. Production

5.1. Exaggeration

In order to maximize the feminine in a masculine face, zippers are used to mark the masculine and feminine in faces. For the part outside the zipper, blusher and eye make-up are done using a pink color that expresses femininity, and lip make-up is applied in red. The inside of the zipper was shaded to show the masculine beauty. The result can be seen in <Table 2>.

First, a design with the motif of drag queen makeup that expresses exaggeration is planned.

Second, a layer of glue stick is applied to the eyebrows to smooth them and then they are covered with white foundation.

Third, a brighter foundation than the original skin tone is applied to the whole face.

Fourth, the entire face is contoured with dark foundation, while the forehead, nose, cheeks, and chin are highlighted with light foundation.

Fifth, powder is applied to prevent oily patches and a zipper is used to divide the male and female parts with a diagonal through the face with the eyes as axis.



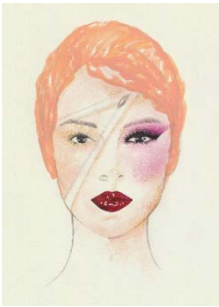

Sixth, for the eye outside the zipper, pink is the main color, gradation is often done with coral color, and artificial eyelashes are used to create richness.

Seventh, blusher is another pink accent.

Eighth, the look is finished with red lips.

Ninth, the eye inside the zipper show the usual men's shaded makeup.

Table 2. Exaggeration as motif.

	Motif	Color	Work process	Work result
Exaggeration				

Note: A. <https://br.pinterest.com>.

5.2. Kitsch

In order to express kitsch, which characteristically provokes laughter through humorous, low-quality and ridiculous make-up and hair, red tones are selected with this characteristic drag queen makeup as a motif. Clown wigs and clips were used as objects, and make-up is done in such a way that it transmits the idea of not matching. The result can be seen in <Table 3>.

First, a design with the motif of drag queen makeup that expresses kitsch is planned.

Second, a layer of glue stick is applied to the eyebrows to smooth them and then they are covered with white foundation.

Third, a brighter foundation than the original skin tone is applied to the whole face.

Fourth, the entire face is contoured with dark foundation, while the forehead, nose, cheeks, and chin are highlighted with light foundation.





Fifth, after using powder to prevent oily patches, the form of an eye is drawn with red and the same color is used under the eye too.

Sixth, heart-shaped sequins are placed under the eye, and colored clips are attached to the eyebrows to create a kitsch feeling.

Seventh, the blusher is the of the same color used for the eye makeup, and it creates a wide look from the center of the cheekbones.

Eighth, the lips look smeared without an outline.

Table 3. Kitsch as motif.

	Motif	Color	Work process	Work result
Kitsch				

Note: A. <https://www.youtube.com>.

5.3. Imitation

Stones of different sizes from tiaras were used as a motif to express splendor by imitating celebrities such as singers, and movie stars that were popular at the time of the motif. The background was white so that the gold color could stand out. The work result can be seen in <Table 4>.

First, a design with the motif of drag queen makeup that expresses kitsch is planned.

Second, foundation that is lighter than the original skin tone is applied to the whole face, and then a diagonal line is drawn on the chin and lower lip with white foundation.

Third, a layer of glue stick is applied to the eyebrows to smooth them, then they're covered with white foundation, and the face is powdered to avoid oily patches.

Fourth, stones are attached to the eyebrow line.


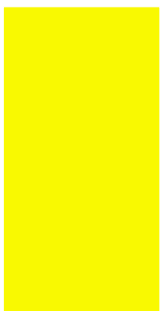


Fifth, the entire eye makeup up is applied in yellow to the base line and it is highlighted with gold. The entire eyelid is filled with eyeliner to create a larger eye.

Sixth, eye makeup is finished with rich lashes and blush is applied to the center of the face with the same color used for the eye makeup.

Seventh, lip makeup is applied filling the diagonal lines of the lips with gold glitter.

Eighth, the diagonal space at the bottom of the face is filled with stones of different sizes.

Table 4. Imitation as motif.

	Motif	Color	Work process	Work result
Imitation				
	A			

Note: A. <https://br.pinterest.com>.

6. Conclusion

This study defines the concept of the drag queen and delves into its aesthetic characteristics through previous studies. The conclusions are as follows.

First, it was discovered that drag queens' influence was expanding through activities such as club shows and parades.

Second, the concepts of color and images evoked by colors were summarized.

Third, drag queen makeup and aesthetic characteristics were classified as exaggeration, kitsch, and imitation through previous studies and literature data.

Fourth, the characteristics of drag queen makeup for ordinary men were classified as exaggeration, kitsch, and imitation, and, according to the images evoked by colors, make-up was reinterpreted to produce three works.

As modern society develops, the perception of gender roles is gradually changing and, In addition, various makeup methods such as makeup that protects the skin from fine dust suitable for the environment of the modern society and makeup that protects the skin barrier are also proposed.

Make-up is becoming a concern for men, not exclusively for women. and the scope has expanded to occupations.

The aesthetic characteristics of drag queens, men who perform in women's clothes and makeup, was analyzed. Drag queen makeup should maximize femininity, so the makeup method can damage the skin, so I expressed femininity with colors.

Drag queen make-up has begun to be recognized as art, and not just for sexual minorities, but research on it is lacking. We hope that various studies on drag queen makeup will be conducted in the future.

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8. Appendix

8.1. Authors contribution

	Initial name	Contribution
Lead Author	JY	-Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/>
Corresponding Author*	JC	-Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/> -Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/>
Co-Author	JL	-Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

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Exploring the Effectiveness and Utilization of Terahertz Waves for the PROTECTION of Human Body

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Abstract

Purpose: Terahertz technology can be easily applied in various fields beyond the laboratory level with the background of modern advanced technology, and the outlook is highly anticipated as a technology with high utilization. This study attempts to look at the characteristics of terahertz waves and check the applied technology currently being used.

Method: This study was conducted to explore the research trend of hyperthermia and the characteristics of terahertz waves, and to find out the counter strategies that can be used for the protection of human body. To achieve this purpose, this study analyzed 40 recent academic studies provided by Korea Education & Research Information Service(KERIS) and DBpia, as well as terahertz science and technology studies of semantic scholars, and analyzed and considered the contents judged to be consistent with this study.

Results: Recently, various treatments are being implemented in parallel from the perspective of holistic therapy in Korea. In particular, for effective cancer treatment, various treatment methods are being implemented independently or in combination, and the thermotherapy is a trend showing synergistic effects of parallel therapy. In addition, the treatment and research of biological mechanism of terahertz waves confirmed the possibility that it could be presented as a complex and multifunctional new concept system for testing, diagnosis, and treatment for chronic diseases.

Conclusion: This study attempted to analyze in several ways the efficacy and utilization of hyperthermia and terahertz waves in human body. Through this study, it was confirmed that the terahertz science and technology are getting more and more attention around the world. In the future, it is expected that further research will be expanded through many experiments to use the terahertz wave generator as a treatment system, and that it will play an important role in a wide variety of applications.

[Keywords] Effectiveness, Utilization, Terahertz Waves, Protection, Human Body

1. Introduction

In Korean society, although life expectancy has increased due to an increase in income and an improvement in living conditions, with this lifespan as extended, the increase in the number of chronic diseases is intensifying day by day. The aging of the population is already a global phenomenon, and Korea cannot be called an exception[1][2]. The Fourth Industrial Revolution in Korea is slowly changing everyday life, but an aging population predicts a rapid change. Korea will enter an ultra-aging society by 2026, and about 36% of the population will be composed of the elderly by 2050, so it is expected that one in three of the total population will become elderly[3][4][5].

As such, the increase and change of the elderly population is bringing about various diseases. In particular, changes in the endocrine system resulting from metabolic syndrome are indicative of a disease in which metabolic diseases increase and immunity decreases due to the accumulation of fat and changes in cholesterol. That is to say, triglycerides and low-density cholesterol, which are harmful to the human body, increase, and high-density cholesterol decreases, leading to heart and vascular diseases, and as the concentration of free fatty acids increases, it is sometimes affected by metabolic diseases in which blood sugar rises[6][7].

In addition, cancer patients are showing changes as well as the extended life span. Looking at the changes in cancer incidence from the Korean National Cancer Center(2018) in Korea in 2016, the number of new cancer patients is 229,180, and there are 120,068 males and 109,112 females. In terms of cancer type and ranking, stomach cancer(13.3%) is ranked the first, colon cancer(12.3%) the second, thyroid cancer(11.4%) the third, breast cancer(9.5%) the fifth, liver cancer(6.9%) the sixth, prostate cancer(5.1%) the seventh, and gallbladder cancer and other biliary tract cancers(2.9%) the eighth, pancreatic cancer(2.9%) the ninth, and kidney cancer(2.2%) the tenth. These recent changes are also estimated due to the fact that changes in lifestyle or dietary culture are increasing the incidence of cancer[8].

Thermotherapy(heat therapy)is a field recently applied to the human body used for the treatment of such increasing chronic diseases and cancer patients[9]. Thermotherapy is a method in which blood vessels in normal tissues expand and discharge heat by inducing an increase of the temperature in the human body. In other words, as it can be a problem because the neovascularization of tumor cells does not expand and cannot release heat, it is a treatment that artificially provides an appropriately proportional temperature through a thermal treatment system to block the supply of nutrients to cancer cells and cause necrosis. From the perspective of holistic treatment, such a thermal treatment method is becoming more important along with surgery, chemotherapy, and radiation therapy, and the synergistic effect is shown by performing concurrent treatment[10][11].

High-frequency thermotherapy is a method of causing thermal coagulation and protein denaturation by causing transitional tumors to high temperature through high-frequency alternating current, and thereby necrosis of cancer cells. Although radiofrequency heat therapy has the advantage of having lower complications than laparoscopy and laparotomy, it is also said that there is a limitation that depending on the location of the transition tumor, there are areas where the procedure is difficult or that local recurrence is common when the number of transition tumors or the tumor size is large[12][13].

In this thermotherapy treatment method, the focus of this study is the protection of the human body in the treatment of chronic diseases and cancer using terahertz waves. The terahertz(THz) technology is well received for opening a new horizon in biomedical application fields. Terahertz waves are electromagnetic waves with small photon energy, and have very little damage to a living body compared to high-power laser beams in an light wave band such as X-rays or ultraviolet rays, and in addition, it is known that there are many objects that can be used because of its long wavelength and peculiar transmittance[14].

Therefore, terahertz technology can be easily applied in various fields beyond the laboratory level with the background of modern advanced technology, and the outlook is highly anticipated as a technology with high utilization. Therefore, this study attempts to look at the characteristics of terahertz waves and check the applied technology currently being used. The results of this study could serve as an opportunity to confirm the usefulness of terahertz waves according to human body application and positive aspects for the treatment of chronic diseases.

2. Research Methods

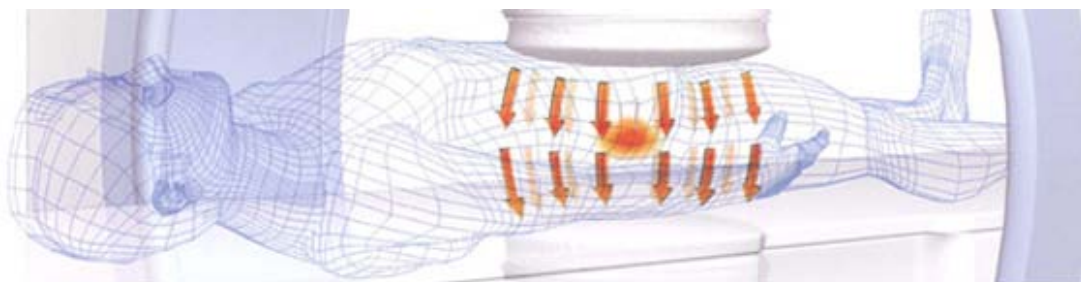
This study was conducted to explore the research trend of hyperthermia and the characteristics of terahertz waves, and to find out the counter strategies that can be used for the protection of human body. To achieve this purpose, this study analyzed 40 recent academic studies provided by Korea Education & Research Information Service(KERIS) and DBpia, as well as terahertz science and technology studies of semantic scholars, and analyzed and considered the contents judged to be consistent with this study. In addition, the equipment of the thermotherapy system that is currently being used in the medical field and being diversified was analyzed and used as picture data to help understanding.

3. Characteristics of Thermotherapy Treatment and Major System of Thermotherapy

In recent years, the health related quality of life in Korea has improved due to the efforts of the National Health Insurance Corporation and the government, and personally, a lot of attention and efforts are being made on health management. However, after 2020, the threat of COVID-19 has placed many restrictions in daily life, and it is true that social distancing and wearing masks are becoming mandatory[15][16]. Accordingly, in Korean society, there are many cases where efforts for health intervention are centered on the home rather than life outside the home[17].

Hyperthermia is a treatment method that has been used for a very long time and is known to be a very useful method because it has little rejection and side effects. As high-temperature thermal treatment of 43°C to 47°C has the effect of destroying tumors, various experimental and clinical results have been published that are effective in combination with radiation and drug treatment or as a single treatment, and in particular, many studies are being conducted to reduce cancer mortality[18][19][20]. Cancer treatment methods used in clinical practice include surgery, chemotherapy, radiation therapy, immunotherapy, hormone therapy, and hyperthermia. Among them, research results have been reported that radiotherapy and chemotherapy in combination with hyperthermia can enhance the therapeutic effect[21][22].

Figure 1. Mechanism of high-frequency thermotherapy method[23][24].



In general, thermotherapy methods are divided into whole body hyperthermia, which is treated by raising body temperature according to the treatment range, and local hyperthermia, which treats local areas such as muscle and cancer tissues. In the cancer treatment method, the principle of hyperthermia is to use the heat sensitivity of cells, and when the temperature around the tumor tissue increases, the normal tissue dissipates heat well, but it induces tumor tissue necrosis due to insufficient blood circulation[24][25]. Local hyperthermia is often used for high-temperature hyperthermia to treat superficial cancer that occurs on the skin and near the skin. This is known because when using local heat, it is possible to improve efficiency, shorten treatment time, and prevent normal cell necrosis due to overheating.

In addition, hyperthermia is used to restore muscle and soft tissue flexibility and to prevent and manage muscle tissue damage. According to reports that the application of hyperthermia

increases muscle elasticity, aids blood circulation, and reduces muscle stiffness and spasm, it can be seen that it is being used as an intervention method to improve pain and other symptoms[26].

Recently, various treatments are being implemented in parallel from the perspective of holistic therapy in Korea. In particular, for effective cancer treatment, various treatment methods are being implemented independently or in combination, and the thermotherapy is a trend showing synergistic effects of parallel therapy. In a recent study on establishing a quality control protocol for a Korean thermal cancer treatment system, it was surveyed that 195 institutions in Korea have 225 thermal treatment systems[12]. In the study, it is argued the thermotherapy system should ensure selective heating of tumor cells with minimum toxicities to surrounding normal tissues, and that quality control is essential to provide effective thermotherapy.

Figure 2. High-frequency thermotherapy system used in Korea.



Celsius42 TCS[27]



Oncothermia EHY-2000[28]



ATAR-300[29]



Thermotron-RF8[23]

The thermotherapy equipment used in Korea according to the producing countries is shown in <Figure 2> below. Celsius TCS is a German equipment, launched in 2006 and uses a positive electrode and uses 13.56 Mhz. It has good thermal efficiency and is known as an equipment that has been proven for many clinical uses. It is a thermal equipment that is the number one introduction in Korea for a short period of time[27]. Oncothermia EHY2000 equipment is a Hungarian equipment launched in the 1990s and uses 13.56 Mhz. The feature is that it is true that most of the thermotherapy equipment uses positive electrodes, but Oncothermia EHY2000 equipment consists of one electrode and a water bed, and is being used in many hospitals[28]. ATAR300 is a thermo-therapeutic equipment recently developed in Korea, and besides, there are various equipment such as Remission, etc. being developed and released, but there are not many empirical studies with proven effectiveness yet, so it seems that it will take more time for multiple uses[29]. The equipment of Thermotron RF8 was developed in Japan in the 1980s, and a positive electrode is used and 8 Mhz is used as a positive electrode. It is not yet widespread equipment in Korea[23]. In addition, Synchrotherm, an Italian thermal therapy device that uses a positive electrode and 13.56 Mhz, and BSD2000, a thermal therapy

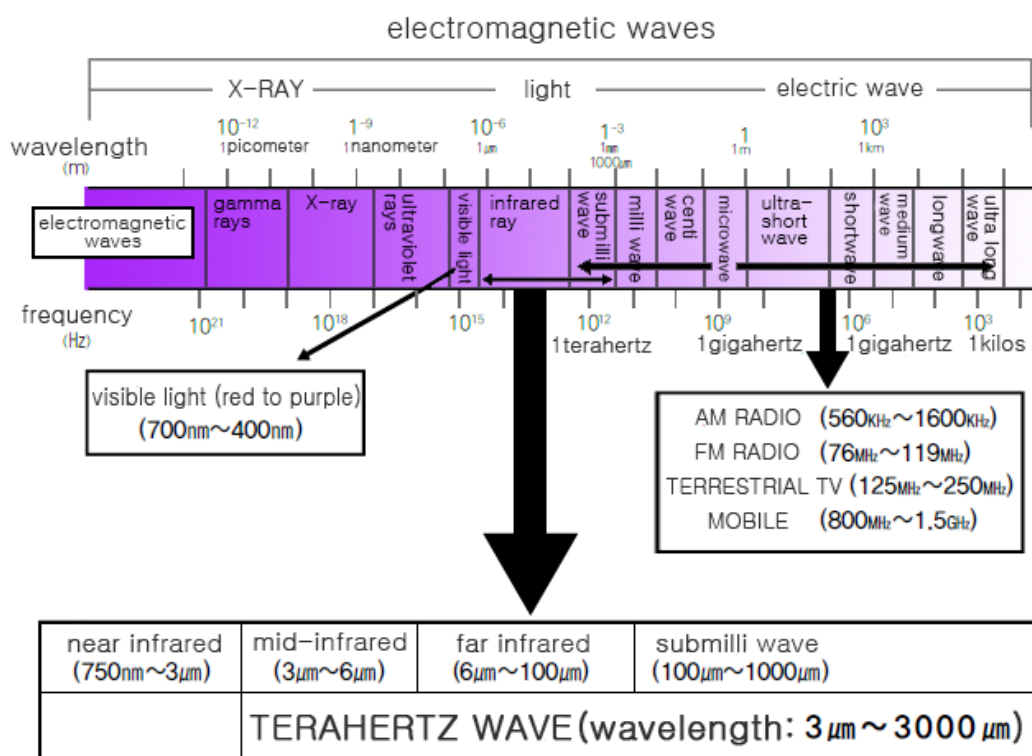
device manufactured in the US, are being used in Korea to treat cancer patients and other chronic diseases.

There is no protocol related to thermotherapy in Korea yet[12]. Therefore, we refer to QA guidelines recommended by institutions such as the European Society for Hyperthermia Oncology(ESHO) and the Hellenic Society of Oncologic Hyperthermia(HSOH)[30]. Recently, in Korea, to reduce errors due to the accuracy of temperature measurement and transmission, operation of equipment, and increase the effect of thermal treatment, research is being actively conducted to develop an optimized Korean thermal treatment system protocol.

4. Proposal for Usefulness and Application of Terahertz Waves to the Human Body

Electromagnetic waves are collectively named for light and radio waves. Electromagnetic waves are a kind of wave motions that transmit space and are classified in various ways by wavelength. In Figure 3, electromagnetic waves are called radio waves, sunlight, X-rays, gamma rays, etc. used in radios, televisions, and mobile phones from the longer wavelength. Among these electromagnetic waves, near-infrared, mid-infrared, far-infrared, and sub-Mila waves are collectively called terahertz waves[31].

Figure 3. Types of electromagnetic waves and terahertz waves[31].



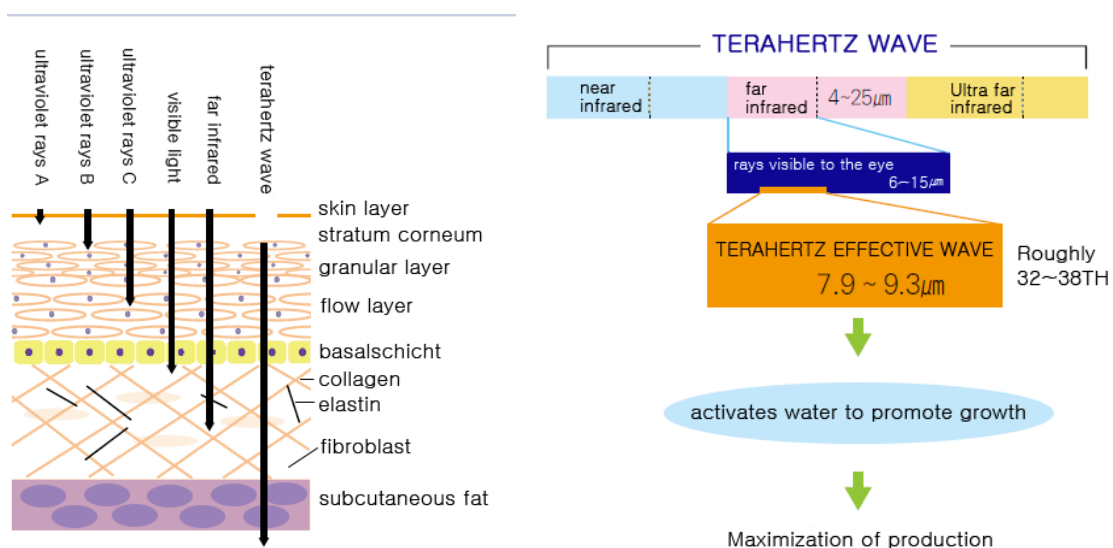
In particular, far-infrared rays have been developed and used as health devices, as they have been discovered in various ways that their transmission capability and permeability are harmless to the human body and have therapeutic effects by raising the temperature of the substance. The above-described high-frequency thermal treatment system method also uses the same principle to diagnose and protect the human body.

Terahertz waves are electromagnetic waves with very little photon energy. Compared to X-ray, ultraviolet, and high-power laser light in the light-wave band, damage to the human body is very small, so it is being recognized for its usefulness. This is confirmed because the terahertz frequency band(0.1~10 THz) is relatively slow among molecular vibrations and is deep-

ly involved in macro structures related to biological functions[32]. In other words, in the diagnosis and treatment of diseases, there exist variously from the micro level of DNA or cells to the macro level of large organs such as body organs, and technologies such as electromagnetic waves, X-rays, CT(computed tomography), ultrasound, and radio waves(RF), etc. are being used according to the difference in absorption depending on the type and density of tissues, organs, and objects in the body.

That is, it can be seen that it has little damage to a living body substance compared to that of a broadband high-power laser light. Looking at Figure 4, terahertz waves show unusual transmittance compared to ultraviolet, far-infrared, visible, and far-infrared rays. In the case of far-infrared rays, which are commonly used, it passes through the base layer of the skin and affects the fibroblast substrate, but in the case of terahertz waves, it penetrates to the subcutaneous fat[31].

Figure 4. The terahertz effective wave and effective wavelength according to skin structure[31].



Therefore, terahertz spectroscopy and imaging technology, in some cases, enables simple and fast molecular-level diagnosis without the use of harmful marker substances, and it is believed that it can be applied to diagnosis such as the identification of cancer cells and normal cells[33]. Currently, there are two main issues regarding the usefulness of terahertz waves. First, the application of terahertz waves technology to biomedical equipment and sensors, and the second is an active treatment field using this technology. One area of interest in this study is the field of therapy using terahertz waves, and it is a therapeutic application for controlling protein mechanism of influx of paramagnetic substances based on the frequency of Lamor Paramagnetic Resonance(LPR).

In the recent bio-convergence medical field, it is argued that it is difficult to accurately identify the influence and effects of simple weak and extremely low frequencies in the existing MHz frequency domain, such as rotation, vibration, and transition of biomolecules on the human body. Therefore, in the γ -dispersion zone(10GHz~1THz) of the biomolecule, it is attempting to investigate the cell signaling control mechanism under the Lamor Paramagnetic Resonance(LPR) condition using high-power electromagnetic waves in the terahertz frequency band[34]. The magnetic resonance-based system of these terahertz waves is expected to be used as a next-generation medical technology for the treatment of incurable hereditary diseases and cancers, including brain diseases such as dementia, Parkinson's disease, and Alzheimer's.

In the biomedical application of terahertz waves, the biggest problem and problem to be solved is the large influence of water, there are still few clinical diagnoses, so there are not many databases on the effectiveness of the study. However, if an attempt is made to exchange open cloud technologies with related fields by fusing deep learning-based big data technology and IT technology, which is called the focal point of the 4th industrial revolution, it can also be expected that it will be possible to build an innovative market in therapeutic applications using terahertz waves.

5. Conclusion and Recommendations

Currently, clinical tests using terahertz waves among hyperthermia are widely used in cancer tests, dental diagnosis, virus and bacterial tests, antigens called immunoassays, and antibody tests. It is confirmed because terahertz waves have very little harm to the human body for measurement and treatment due to the non-invasive action of terahertz waves.

The terahertz waves are located at the boundary between radio waves and light waves, and include near-infrared and mid-infrared, far-infrared, and sub-milli waves. However, due to insufficient light source(signal source) development and measurement technology for medical applications using terahertz waves, which is a radio wave resource, research for the protection of human body has not been carried out in abundance. But recently, with the rapid development of bio-signaling technology through the development of terahertz spectroscopy technology and the basis of magnetic resonance, the terahertz band has a wider bio-application potential[35]. In particular, as terahertz waves resonate with vibration relaxation and rotational mode of biomolecules, it has been confirmed that there is a potential for special similar treatment effects that can be obtained from the relationship between mid-infrared rays and living tissues[32][36]. Therefore, the review of the effectiveness of terahertz waves for the protection and treatment of human body is an important issue of task that needs to be reviewed carefully.

This study attempted to analyze in several ways the efficacy and utilization of hyperthermia and terahertz waves in human body. The treatment and research of biological mechanism of terahertz waves confirmed the possibility that it could be presented as a complex and multi-functional new concept system for testing, diagnosis, and treatment for chronic diseases. If the control and regulation of the possibility of application of terahertz waves to the human body are further scientifically identified in the future, it could be a breakthrough treatment research beyond the existing paradigm.

Through this study, it was confirmed that the terahertz science and technology are getting more and more attention around the world. In the future, it is expected that further research will be expanded through many experiments to use the terahertz wave generator as a treatment system, and that it will play an important role in a wide variety of applications.

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7. Authors Contribution

	Initial name	Contribution
Lead & Corresponding Author*	JL	-Set of concepts <input checked="" type="checkbox"/>
		-Design <input checked="" type="checkbox"/>
		-Getting results <input checked="" type="checkbox"/>
		-Analysis <input checked="" type="checkbox"/>
		-Make a significant contribution to collection <input checked="" type="checkbox"/>
		-Final approval of the paper <input checked="" type="checkbox"/>
Co-Author	TK	-Corresponding <input checked="" type="checkbox"/>
		-Play a decisive role in modification <input checked="" type="checkbox"/>
		-Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/>
		-Participants in Drafting and Revising Papers <input checked="" type="checkbox"/>
		-Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>