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## Quality INVESTIGATION of Rice Noodles Safe from Gluten

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### Abstract

*Purpose; To prepare gluten free noodles, tapioca starch added to dry rice flour to prepare noodles, and color, texture and sensory evaluation were performed to determine the optimum amount of starch added. As a result of measuring the color value of rice noodle, TS10(10% of tapioca starch, 90% of dry rice flour) was the most similar in lightness. As a result of texture measurement of rice noodles, the hardness of rice noodle added with tapioca starch increased with the addition of starch, and the chewiness and cohesiveness were significantly higher than that of rice noodles. The addition of 5% and 10% of tapioca starch added to dry rice flour showed similar results to that of commercially available rice flour noodles. Therefore, the amount of starch added to dry rice flour is thought to be 5% and 10% of tapioca starch.*

**[Keywords]** Investigation, Gluten Free Noodles, Dry Rice Flour, Texture, Sensory Evaluation

## 1. Introduction

Noodles make dough by putting water into grain flour. And it is a food made by pulling out slender long. It is a processed food made from a typical wheat flour, which is made by mixing salt and water in flour, mixing water and putting it into the unique properties of wheat gluten[1]. Rice noodle made from rice has low sodium content, rich in fiber, easy to digest carbohydrate[2], However, it is less volume and less elastic than wheat flour noodles. Therefore, rice flour added with gluten in rice flour noodles is being studied[3][4][5]. But gluten causes Celiac Disease[6]. Therefore, for the health of consumers, it is urgent to develop rice noodles without added gluten. At present, rice consumption is significantly decreasing[3]. In order to increase the consumption of rice, it is urgent to develop various processed foods using rice[7][8]. To improve the cooking aptitude of rice noodles, physical properties need to be improved. Research has been reported on the use of starch obtained by a chemical modification process as a method for

improving such physical properties[3][9]. However, there is an urgent need to study how to solve this problem. Tapioca starch made from cassava roots is high in digestion and absorption. When added, it increases the texture and moisture content. So it is mainly used when processing gluten free food.

In this study, we aimed to promote the consumption of rice and to make rice noodles safe from gluten. We prepared noodle rice without gluten by adding natural tapioca starch to dry rice flour which can be easily obtained, and we tried to determine the optimum amount of tapioca starch by measuring texture, color and sensory evaluation.

## 2. Experimental Methods

### 2.1. Color value measurements

The color value was measured using color meter(Color meter, JC-801, Color Techno Co, LTD, Japan); the rice noodles was put into cylindrical

container(35×10 mm); each sample was measured five times and its average was used.

## 2.2. Texture measurements

After sugaring of the rice noodles, its Hardness, Springiness and Chewiness were measured using Texture analyzer(TA-XT Express, Stable Micro Systems, UK) with 70 mm cylinder probe(Pre-test speed: 1.0mm/s, Test speed : 0.5 mm/s, Post-test speed: 0.5 mm/s, Distance: 2.0 mm, Time: 5.0 sec, Trigger Force: 5.0 g).

## 2.3. Sensory evaluation

The sensory evaluation items were measured transparency, glossiness, savory flavor of rice, savory taste of rice, smoothness in mouth, hardness and chewiness, after taste, and the preference items were the appearance, flavor, taste, texture, overall acceptability, 1 point is very bad (very weak), and 7 points is very good(very strong).

## 2.4. Statistical methods

The results of rice noodles Texture, color value and sensory evaluation were analyzed using ANOVA, and the significance test was done through Duncan's multiple test at  $p < 0.05$ . The analysis used SPSS WIN program 20.0.

## 3. Results and Discussion

### 3.1. Color value of rice noodles

<Table 1> shows the results of measuring the color of rice noodles prepared with rice noodles by adding tapioca starch.

The lightness(L value) of the control of Vietnamese rice noodle was 66.38, and the lightness of the rice noodle TS made only with dry rice flour was 63.29. Rice flour added with tapioca starch was 62.82-68.85, which showed significant difference between the samples. As the amount of tapioca starch added, the lightness of rice flour increased.

The yellowness value(b value) was -0.64 for the control and -6.18 for the TS. The yellowness of rice noodle added with tapioca starch was 1.83 - 0.26, which was significantly higher than

that of rice noodle added with tapioca starch. Kim(2011) also showed that the b value increased with increasing amount of semolina[10].

As a result, noodles were prepared by adding tapioca starch to dry rice flour and TS10(10% of tapioca starch, 90% of dry rice flour) was found to be the most similar to the commercially available rice noodles.

**Table 1.** Color values of rice noodles made with dry rice powder and tapioca starch.

	L value	b value
Control <sup>1)</sup>	<sup>2)</sup> 66.38±0.00 <sup>c4)</sup>	-0.64±0.01 <sup>c</sup>
TS	63.29±0.42 <sup>d</sup>	-6.18±0.20 <sup>f</sup>
TS5	62.82±0.02 <sup>e</sup>	-1.83±0.03 <sup>e</sup>
TS10	67.67±0.01 <sup>b</sup>	-1.31±0.01 <sup>d</sup>
TS15	68.68±0.01 <sup>a</sup>	0.01±0.02 <sup>b</sup>
TS20	68.85±0.02 <sup>a</sup>	0.26±0.012 <sup>a</sup>
F - Value	692.850 <sup>***3)</sup>	81.943 <sup>***</sup>

Note: <sup>1)</sup>Control : Finished product rice noodles of Vietnam

TS : Rice noodles made of dry rice powder 100%

TS5, TS10, TS15, TS20 (Dry rice powder : Tapioca starch ; 95:5, 90:10, 85:15, 80:20

<sup>2)</sup>Means±S.D. <sup>3)</sup>\*\*\*  $p < 0.001$

<sup>4)</sup>Means in a row by different superscripts are significantly different at the  $p < 0.05$  by Duncan's multiple range test.

### 3.2. Texture of rice noodles

<Table 2> shows the results of measuring the texture of rice noodles by adding tapioca starch to rice flour.

Hardness was measured as 841.20 g/cm<sup>2</sup> for the control and 360.00 g/cm<sup>2</sup> for the TS. TS5 was 364.23 g/cm<sup>2</sup>, TS10 was 408.86 g/cm<sup>2</sup>, TS15 hardness was 433.20 g/cm<sup>2</sup>, and TS20 was 550.83 g/cm<sup>2</sup>. The hardness of rice noodles increased significantly with the addition of tapioca starch compared to rice noodles prepared only with 100% dry rice flour. In Yun(2011) study on the addition of tapioca starch, the hardness of rice bread decreased as the amount of tapioca starch added increased[11].

The results of springiness are as follows. The elasticity of rice noodles decreased with the addition of tapioca starch. The elasticity of rice, noodles, and rice were lower than those of control 0.72, TS 0.92, TS5 0.86, TS10, TS15 and TS20 were 0.83.

The chewiness of rice noodles was the highest at 558.1 in the control, and the chewiness of rice noodle TS prepared with 100% dry rice flour was 279.11. The chewiness of rice noodle added with

tapioca starch was 279.84 - 390.63. It is thought that, as in the hardness measurement results, when noodles are prepared by adding tapioca starch to rice flour, the small particles of starch and the large particles of rice are well mixed with each other, and the texture becomes tight and the noodles become hard.

Dry rice flour was prepared by adding tapioca starch to make rice noodle and texture. The result showed that hardness, chewiness were lower than that of control rice noodle, which is a commercial rice noodle. It is considered that the content of amylose and amylopectin in rice is different, and the addition of starch to rice noodles makes it harder and harder than that of noodles made with 100% rice. As the amount of starch added increases, hardness, chewiness.

**Table 2.** Texture of rice noodles made with dry rice powder and tapioca starch.

	Hardness	Springiness	Chewiness
Control <sup>1)</sup>	<sup>2)</sup> 841.20 ±28.53 <sup>a4)</sup>	0.72 ±0.64 <sup>c</sup>	558.18 ±35.37 <sup>a</sup>
TS	360.00 ±25.06 <sup>d</sup>	0.92 ±0.02 <sup>a</sup>	279.11 ±10.75 <sup>d</sup>
TS5	364.23 ±27.10 <sup>d</sup>	0.86 ±0.01 <sup>ab</sup>	279.84 ±17.40 <sup>d</sup>
TS10	408.86 ±8.52 <sup>c</sup>	0.83 ±0.05 <sup>b</sup>	289.12 ±12.10 <sup>d</sup>
TS15	433.20 ±17.31 <sup>c</sup>	0.83 ±0.02 <sup>b</sup>	324.14 ±13.90 <sup>c</sup>
TS20	550.83 ±4.30 <sup>b</sup>	0.83 ±0.02 <sup>b</sup>	390.63 ±9.98 <sup>b</sup>
F - Value	377.697 <sup>***</sup>	4.090 <sup>**</sup>	66.892 <sup>***3)</sup>

Note: <sup>1)</sup>Control : Finished product rice noodles of Vietnam  
<sup>2)</sup>TS : Rice noodles made of dry rice powder 100%  
<sup>3)</sup>TS5, TS10, TS15, TS20 (Dry rice powder : Tapioca starch ; 95:5, 90:10, 85:15, 80:20  
<sup>4)</sup><sup>2)</sup>Means±S.D. <sup>3)</sup>p<0.001, <sup>\*\*</sup>p<0.01  
<sup>4)</sup><sup>a-d)</sup>Means in a row by different superscripts are significantly different at the p<0.05 by Duncan's multiple range test.

### 3.3. Sensory evaluation of rice noodles

Dried rice flour was prepared by adding tapioca starch to rice flour and subjected to sensory evaluation <Figure 1>, <Figure 2>.

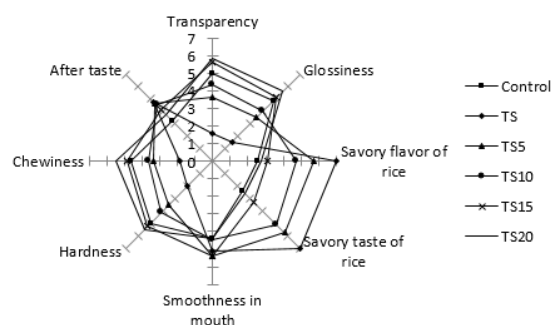
Transparency of rice noodles was the most transparent in TS20, and there was a significant difference between the samples. The glossiness TS20 was the highest among the samples. The

savory flavor and taste of rice were lowest in the control group, and TS had the strongest savory taste of rice. The smoothness in mouth was not significantly different. Hardness and chewiness were significantly higher in TS20 than in other samples, TS was lowest, and noodles were harder as tapioca starch was added. Smoothness in mouth was not significantly different, and hardness and chewiness were significantly higher in TS20 than in other samples. The after taste of rice noodles was significantly stronger at TS <Figure 1>.

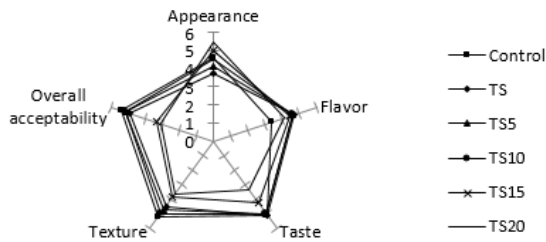
As a result of the preference test, TS20 showed the most favorable appearance, and appearance was preferred with increasing amount of tapioca starch. The flavor of TS was the most favored compared to other samples, and taste of Control and TS were significantly similar and TS5 and TS10 were significantly similar. The control group showed a higher preference for texture than the other samples, and the overall acceptability was favored by the TS5 and TS10 were significantly higher <Figure 2>.

Therefore, addition of tapioca starch, rice noodles, and taste test were evaluated. The addition of 5% and 10% of rice noodle added tapioca starch was also evaluated. The amount of starch added to dry rice flour is thought to be 5% and 10% of tapioca starch.

**Figure 1.** Quantitative descriptive analysis results of noodles made whit dry rice powder and tapioca starch.



**Figure 2.** Quantitative descriptive analysis results of noodles made whit dry rice powder and tapioca starch.



## 4. Summary and Conclusion

To prepare noodles without added gluten, tapioca starch was added to dry rice flour to prepare noodles, and color, texture and sensory evaluation were performed to determine the optimal amount of tapioca starch and to easily make 100% rice noodle at home.

(1)The color of rice noodle with tapioca starch added to dry rice flour was significantly similar to that of commercially available rice noodle with TS10 similar in lightness.

(2)The hardness of rice noodle added with tapioca starch increased with the addition of starch, and the chewiness, and cohesiveness were significantly increased.

(3)The rice noodle added with tapioca starch showed no significant difference from the control group in transparency, gloss, fragrance and taste of rice, hardness, chewiness, and aesthetics. It was found that 5% and 10% of tapioca starch was evaluated well there was.

Therefore, the addition of proper tapioca starch added to dry rice flour is considered to be 5% and 10%, and it is possible to manufacture rice noodle added with tapioca starch.

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## SECURITY Comparison on KOREAN Password / Authentication Policy and Other Countries

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### Abstract

*Password is needed to create an account in most of the websites. Each website has different password and authentication policy when making an account. In addition, each country has different trend of policy in making the passwords. There are many researches about strong password and usable password. However, when it comes to practical, real world cannot adapt strong and usable password policy. South Korea is known for IT (Information Technology) and assumed to be secured in cyber space as well. However, South Korea has many problems regarding the leakage of accounts due to the password hacking. Countries beside Korea also may have analogous situation, but they may have different policies compare to Korea. Therefore, this study generally compares Korean websites' password and authentication policies and other 5 countries' policies by gathering policies from Alexa website and suggests recommendations.*

**[Keywords]** *Private Security, Password Policy, Authentication Policy, Korean Password Policy, Password Strength*

## 1. Introduction

Password is a text composed of characters and symbols. It is mostly used to identify and access our account. In other words, password is usually created when making an account in a website. Each website has different policies in making the password. There are many researches until recently about making stronger passwords, and usable passwords such as adapting blacklisted passwords, more developed password meter[1][2]. However, it is difficult to implement every research into the policy for each website. This is because in the real world, people try to use easier and convenient way to use the password. Strong password requires hard combination and longer passwords which people are not that preferable to. Therefore, websites' have different password and authentication policy during the registration. In addition, of the

various policies, websites turn out to have similar policies from the same country and this show the policy trend from a country.

In this paper, we compare the password policies and authentication policy from 6 different countries. Through the comparison of the policies, we explain the result and suggest recommendation for better and usable policy for South Korea.

The contributions of this paper as follows:

- Referring to the 'Alexa' website, a vast amount of data of password policy is collected
- Data are transformed into numerical values for accurate comparison

- Results from comparison show the trend of a country password policy and authentication policy
- Suggest recommendation of better password policy for Korea from other countries.

In section 2, we present the method of the research. It shows which features were used to evaluate the policies and from where the data was gathered. Next, we explain and discuss about the result according to the Tables and a Figure. At last, in section 4, we conclude the paper.

## 2. Methodology

'Alexa' website[3] presents the rankings of the most visited site for each country around the world using the traffics. In this paper, total of 147 websites' password policy from 6 different countries were gathered as shown in <Table 1>. <Table 1> shows the list of the websites categorized by countries that has been used for this research. At the country name column, it also includes the information of the common end at the DNS such as .com, .net, and .co.kr.. Moreover, at the list of the websites, total number of gathered data and the number of websites which have the password policy are also mentioned. The countries mentioned in the paper were America, Japan, Germany, India, China, and South Korea. We tried to gather the data from various continents in order to see the trends outside from South Korea as well.

Moreover, 'Alexa' shows 100 web pages for each country, and we chose websites which are from that country. For example, Japan's most visited website is Google, however, we excluded Google since it is not originated from Japan itself. In addition, porno, malicious pages were also excluded from the data. Furthermore, out of 147, 24 websites were excluded because its websites were unable to create an account which means that there is no password policy. This paper uses the policies from most visited site which means that this also represents the trend of a country's policy.

The websites were grouped by countries. We evaluated the password policies(First factor authentication) of each country and comprehensive authentication policies of each country. First, to find out the password policy of each website, we evaluated 8 features by creating an account. The 8 features were as followings:

- HTTPS
- Minimum Character
- 3class8
- Symbol
- Upper letter
- Digit
- Common/easy words
- Password meters

We marked each feature 1 or 0 that cannot be expressed in numbers. If the feature in the policy satisfies, we marked 1 and marked 0 if not. Https[4] is to show the secureness in the transport layer. If the address of the website includes https, we marked it as 1. Minimum character means the condition for the length of the password. To be specific, it defines the least amount of characters to create the password. 3class8 refers to the condition that satisfies 3 of the followings(uppercase letter, lowercase letter, digit, symbol) and 8 minimum characters. Common and easy word means for the requirement that blocks the common and easy words such as 'apple', and 'aaa' in the password. Lastly, the password meter feature is the existence of the meter bar showing how safe the created password is. Password meter is a real-time feedback on how much your password is strong[5][6]

After evaluating the features of the webpages one by one, we calculated the average of each feature. Next, to find out the comprehensive authentication policies, we analyzed the characteristics of each country. A process of creating an account from each website was needed to find out the policies.



**Table 1.** List of the websites by countries.

Country (common-end)	Website (Total number / Number of password policy existing webpage)											
	Face-book	Twitter	Insta-gram	Linkedin	Reddit	Google	Yahoo	Bing	Ama-zon	Ebay	Apple	Mi-crosoft
America (.com, .tv)	Face-book	Twitter	Insta-gram	Linkedin	Reddit	Google	Yahoo	Bing	Ama-zon	Ebay	Apple	Mi-crosoft
	Netflix	Twitich	14 / 12									
Japan (ne.jp, co.jp, .com)	Nicovi deo	Rakuten	Fc2	Kakaku	Ame-Blo	Live-door	Haten	Weblio	8 / 7			
Germany (.de, .net)	T-online	Spiegel	Bild	Focus	Otto	Idealo	Web	Gmx	Post-bank	Welt	10 / 6	
India (.com, .news, gov.in)	On-linesbi	Flip-kart	Indi-Atimes	Irctc	Hdfc-bank	Ici-cibank	Rediff	Naukri	Imdb	Jabong	New-strend	Cric-buzz
	Ndtv	Sarkari result	Paytm	On-ckds	Bill-desk	Uidai	18 / 10					
China (.com, .cn, .net)	Baidu	Tmall	Qq	Taobao	Sohu	Dina	Jd	Weibo	360	So	Tianya	Zhihu
	Douyu	Mama	China	Huan-qju	Bilibili	People	Aliyun	Alipay	Csdn	Youth	Xinhua net	Sogou
	Baby-tree	Rednet	26 / 19									
South Korea (.com, .co.kr, .net, .in, .go.kr, .tv, or.kr)	Cy-world	Say-club	Sara-min	Job-ko-rea	Al-bamon	Alba	Ppom-ppu	Chol	To-dayhu-mor	Clien	Jubum onitor	Tason
	Marumar	Egloos	Nate	Daum	Naver	Zum	Mo-neta	G market	Store.-emart	Home plus	Cou-pang	Logii
	11st	Auc-tion	Da-nawa	Interpark	Epost	Korail	Kakao	Star-buckr	Kitri-bob	Kt	Uplus	Tworld
	Gsre-tail	Lpoint	Ok-cash-bag	Cjone	Afreeca-tv	Gomtv	Pan-dora	Donga	Joins	Mk	Seoul	Chosun
	Kbs	Sbs	Imbc	Nexon	Pmang	Net-marble	Han-game	Filejo	Ondisk	Filecity	File-ham	Share-box
	Ebs	Home.kepco	Pyeon-gchang 2018	Q-net	Shin-han	Rankey	Ahnlab	Woori-bank	Ibk	Kbstar	Bank-ing.no nghyup	71 / 67

### 3. Result

#### 3.1. Password policy

Result of the password policy is as shown in <Table 2>. The country which uses https the most is America. From the websites we experimented, every website had https for America. South Korea has 75% of https webpages which is at 3<sup>rd</sup> ranking among 6. Japan has only about 28% of https which is the last standing.

Second, the longest letter requirement for password is Germany with average of 7.33 letters. South Korea is next which is 7.16 characters. The rest of the countries have less than 7 characters in average. The last standing country is China.

Moreover, the country which has the highest percentage of adapting 3class8 policy is India. South Korea is next, and the average is about 48%. There are countries that do not adapt the 3class8 rule such as Germany, Japan, and China.

Next, South Korea required symbol in their password as mandatory 48% in average. There are not many websites that need the symbol as mandatory. The highest country which required digit in the password is Japan

in average about 85%. This policy has wide range from 0% to 85%. Most countries mostly have low percentage, however, South Korea have approximately 80% which is the second ranking. The number of websites that block common words when creating a password is low overall. Among the 6 countries, South Korea had the highest average about 39% in average.

Lastly, the country with highest percentage of having password meter bar is Germany about 83% in average. Other than Germany, most countries have low percentage with password meter bar. South Korea has about 32% in average which is second last standing among 6.

In conclusion, overall strength of the password can be acquired by the average of the 8 factors. As a result, South Korea has the highest average compared to 5 other countries. It can be seemed that South Korea has the safest password policy. However, having the safest password policy does not mean that it is safe and usable. Safe and usable are tradeoffs which are the reason the policy should be well-made. There are better factors which are more convenient to use and make a safer policy than now from other countries.

**Table 2.** Evaluation of the password policies(First Auth. Factor) for each country.

Country	America	Japan	Germany	India	China	South Korea
Https(%)	1	0.285714286	0.833333333	0.9	0.526315789	0.75
Min. Ch(num)	6.785714286	6.714285714	7.333333333	6.8	6.421052632	7.161764706
3class8(%)	0.142857143	0	0	0.5	0	0.485294118
Symbol(%)	0.142857143	0.285714286	0	0.4	0	0.485294118
Upper(%)	0.142857143	0	0.166666667	0.4	0	0.088235294
Digit(%)	0.214285714	0.857142857	0	0.5	0	0.808823529
Common(%)	0.285714286	0.142857143	0.166666667	0	0.052631579	0.397058824
Pwd Meter(%)	0.357142857	0.285714286	0.833333333	0	0.526315789	0.323529412
Average	1.133929	1.071429	1.166667	1.1875	0.940789	1.3125

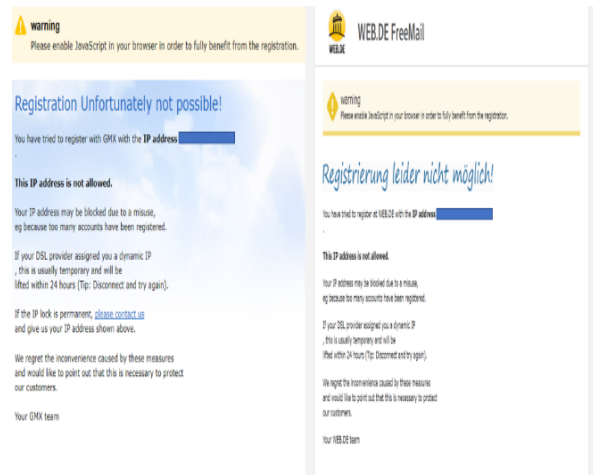
### 3.2. Comprehensive authentication policy

There are many countries overlapping America sites such as Google, Amazon, YouTube, etc. in the ranking in Alexa. This is because those sites mentioned above are especially more popular and well service providers. During the experiment, overlapped sites were removed and only sites made from their own country were left. As a result, there is a distinction between countries where some have willingness to use websites that are popular web services and others that uses their own. In the case of a country with the willingness, it can be said that they follow American password policies. For instance, India and Japan are the countries which use America websites rather than their own made web services as shown in <Table 3>. <Table 3> shows the summary of the common and distinct characteristics of each country.

In America, when creating an account, the process is relatively simple. It depends on which kind of the service the website provides, but relatively low-sensitive service does not require difficult and complex password. In addition, password policy requirements are also not tricky, which is an advantage when gathering new users. However, this could be targeted to be attacked due to the easy process[7]. To overcome the problem, if the account is determined to be too easy after registration or the change of the password, the user will be continuously requested for an additional authentication factors or password changes. This policy is followed by the guidelines from NIST released in 2017 which enables to create password more easily and flexibly[8].

Similarly, in Germany, the password policy is easy and the process to register is convenient. However, to protect from the attacks some sites refuse to register as shown in <Figure 1> because of the IP addresses' location. Only IP addresses from Germany or countries near Germany such as Swiss are allowed to register. Therefore, regarding Germany's password policy and security policy, Germany accepts users depending on the area.

Figure 1. German website declining registration.



In the case of China, it was one of the countries that did not depend on the popular web service sites. It can be seemed as China's own security and password policy, but it can be also said that China's password policy is vulnerable. Compared to other countries, there is no prevention for relatively simple characters such as 'aaaa' and short password length like 3 characters total. However, in order to cover the weakness, most sites in China have a secondary authentication factor such as mobile or email.

On the other hand, in India, it is the country which is most dependent on the American websites. Many websites are able to sign up through account synchronizing with Google or Facebook. The reason for this is convenience. This trend shows that India is also following American password policy. However, password policies that do not synchronize are relatively weak. Allowing common word password and absence of the password meter bar present that passwords can be easily created without the second authentication. In addition, India has a number of websites that do not require registration at all compared to other countries. Therefore, it is convenient to acquire information from the website.

Equivalently, in Japan, it seems to depend on the American site as well. Many sites from the ranking in Alexa were American websites. It represents that Japan also follows the American password policy. However, there was one other feature on the Japanese web-

site different from other 5 countries. Secondary authentication factors in other countries mostly are mobiles or emails. In Japan, however, there are relatively many websites that require image authentication as second authentication factor.

Finally, in South Korea, it is one of the countries that is relatively unaffected by the American websites like China. There are many self-produced websites, and the safety of the security is compared from the others. In the area of P2P and community websites, security

of password is relatively weaker than the well-known portal site or service web site in Korea. South Korea password policy is safer compared to other countries, but it gives high burden to the users[9] during registration. The length of the password and the use of 3class8 are also considered the highest among the 6 countries, and the process of identity verification for the secondary authentication factor is also applied to most websites.

**Table 3.** Comprehensive policies of each country.

Country	Characteristic	Willingness to use American websites	Strength or Weakness
America		Have dependent on American websites	Keep contacting user if the password is weak
Japan			Uses image authentication as 2 <sup>nd</sup> authentication
India			High rate of websites uses synchronization to Google or Facebook to create account
Germany		-	Must be located near Germany to create an account
China		Prefer using self-produced websites	Some websites have very poor password policy
South Korea			Safe password policy but inconvenient

### 3.3. Recommendation on policy

South Korea password policy is the safest policy among the 6 countries. However, researches have shown that current password composition policy does not mean it is the best. There are tradeoffs between complex in password and convenient[10]. Due to the reason that the safety of the password policy is strong, it could also make a phenomenon which is difficult and inconvenient when creating the password. To overcome the disadvantage, modifying the authentication policy

could increase the safety and comfort during the registration.

To make South Korea to have better authentication policy, using and adapting other countries' policy is helpful. South Korea has the guidelines for creating password[11]. However, it has not been updated since 2010 which requires adaptation of current situation. During the process of creating an account, South Korea has quite uncomfortable

time because of satisfying the password requirements. To simplify the process, at the first stage of making an account, website should not require difficult requirements and let users decide to make it difficult. In addition, when changing the password it is predictable when changing the password after the first password[12] because usually users change the password to similar one. Therefore, like America, if the users' passwords are determined to be simple or similar to the past password, contacting directly to change the password more complex would make users more convenient during the registration and keep the password safe.

Moreover, implementing image authentication as second authentication factor like Japan would be a simple and fast way to make safer and expedite the registration. Currently, most of the websites use mobile number which takes a long time to verify the user.

Lastly, if the websites' need or users are mostly from inside the country, blocking IP addresses from outside the country can make much safer like Germany. There are many malicious attacks made by hackers outside the country. However, with this policy, it would be better to reduce the ranges of attackers dramatically.

## 4. Conclusion

In this paper, we compare both password and authentication policies from 6 countries, and 147 websites from 'Alexa'. Among the 6 countries, South Korea had the safest password policy. However, since the password policy makes the account registration difficult and inconvenient, we suggest letting the user to decide the password themselves, implementing image authentication as second authentication factor, and blocking IP addresses that are outside of the country. Further research is

needed to accurately analyze the authentication policy because the analysis of the policy was based on empirical events not numerical.

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## A Critical INVESTIGATION of Discourse on Child Abuse in the Online Child Care Communities

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### Abstract

*This study aimed to review discourses on child abuse that are formed in online communities related to child care information and examine interactions that contribute to the formation, criticizing violent environments against the growth of the social week or children and providing how to cope better with the harmful conditions. For this aim, the study selected some credible online communities that provide child care information and collected data from them for this research. More specifically, the research reviewed materials and replies regarding child abuse that are posted in those online communities. And then, this study analyzed the posts by using Fairclough's Method of Critical Discourse Analysis in order to determine the superficial and social meanings of discourse on child abuse and socio-cultural implications of that abuse. The analysis found that superficially, information about domestic violence and trustless early childhood education institutions brings the mass media-based formation of discourse on child abuse which focuses its lenses on the traditional notions of corporal punishment and discipline and puts child abusers under intense criticism and hatred. Socially, discourse on child abuse is formed in conjunction with social factors including images from mass media that show abusive parents, family discord, poor domestic environment and excessive child protection involving corporal punishment or discipline. Socio-culturally,, finally, discourse on child abuse has practical implications for the need to take measures for children's human rights and against child abuse, increase child protection agencies and provide parent education. This study is significant in that it tried to help raise social attention to child abuse and provide social or institutional solutions to the problem by investigating discourse on child abuse that is formed in the online child care communities and discussing problems like poor domestic environment that my contribute to child abuse.*

**[Keywords]** Investigation, Child Abuse, Theory of Critical Discourse, Fairclough, Community Discourse

### 1. Introduction

In the past, Korea had little discrimination between abuse and discipline under the influence of Confucianism. In a similar vein, child abuse at the nursery home or school was considered not as a social problem, but just as a reasonable corporal punishment. But recently, an increasing number of online cafes and social network services(SNS) based on the development of Internet technology and the proliferation of smart devices are quickly spreading information related to child abuse,

contributing to a social recognition that views child abuse as a crime[1].

Early childhood exposure to abuse is even more influential to human development than adulthood exposure to it[2]. The abusive experience in the period of growth has negative effects on emotions, self-esteem, peer communication skills, interpersonal relations and so on[3][4]. Negative influences that child abuse on physical and mental development are rather sustained[5]. Notably, it's possible that children who are the victims of abuse will show social aggressiveness as they grow

up[6]. Lately, thus, child abuse is apparently emerging as a serious social issue. In a similar vein, many different causes of child abuse are being newly identified, especially in conjunction with the prosperity of online communities. All of these situations are bringing child abuse into the great theme of social discourse. The way that such discourse is formed and developed is affected a lot by the online world. In particular, online child care communities are becoming a new area of discourse on child care-related issues including child abuse, in which the community members share feelings, thoughts, emotions, distress, the sense of belonging of homogeneity and exchange a variety of child care information that may actually influence the attitudes or behaviors of child care[7]. Traditionally, child care was a matter of discussions by a limited range of people, who are physically near, like family, relatives and friends. Virtual media or online communities are now replacing the tradition with the formation and development of social discourse that is even more influential. This study looks into the online child care communities where parents' talks about child abuse lead to the formation of discourse on the matter. And the study attempts to investigate social and/or institutional contexts in which those intercourse are interactively produced and practiced by using Fairclough's(1995) framework of critical discourse analysis. This move would, expectedly, contribute to making online discussions on child abuse emerge as socially influential discourses and ultimately realizing legal and institutional improvements to eradicate the abusive situation[8].

## 2. Critical Discourse Analysis(CDA)

Discourse has different meanings that are differently interpreted. From the view of polysemy, discourse may have a variety of meanings ranging from 'a series of statements, utterance, dialogues or discussions' to 'spoken words or conversations in opposition to written texts'[9]. In general, however, discourse is defined as a body of linguistic and semiotic

constructs including utterance, texts, genres or gestures that have a particular meaning or message[8]. Critical discourse analysis is to examine such structural relationships in discourse, whether spoken or written, as dominance, discrimination, power and control and reveal power relations or ideologies hidden in discourse, ultimately analyzing casual relations between discourse and social practices. This study tried to develop discussions with reference to Fairclough's Critical Discourse Analysis in which the substantial or situational contexts of social environment are considered important.

Fairclough(1995) attempted critical discourse analysis from a comprehensive view that bridges between texts and social practices. For the attempt, he assumed 3 conceptual dimensions like text, discourse practice and socio-cultural practice. The process of discourse analysis is comprised of describing the characteristics of text, interpreting relations between discourse practice and text and explaining relations between discourse and socio-cultural practice[8]. In the dimension of text, what to be analyzed are the contents and form of discourse. In the dimension of discourse practice, interactions between texts are focused. In discourse analysis based on the same dimension, the nature of the process of meaning formation is examined with a combination of texts taken into consideration and the texts are correlated to social practice. When it comes to the dimension of socio-cultural practice, discourse analysis is made in conjunction with different socio-cultural levels like situational, institutional or social contexts under the assumption that power and ideologies may affect those contexts[10].

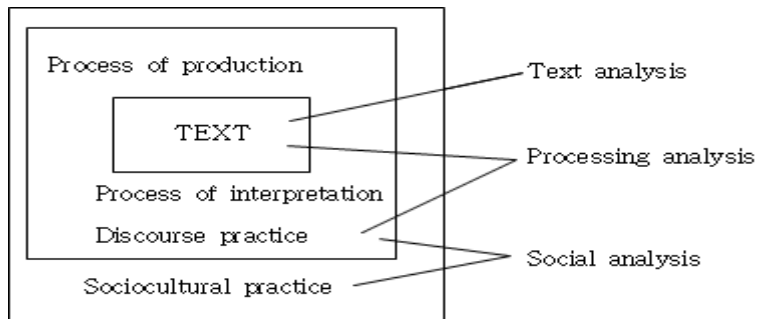
In critical discourse analysis, the above dimensions of text, discourse practice and socio-cultural practice are used as frameworks to analyze discourse in form of description, interpretation or explanation. More specifically, the analysis provides a description of the linguistic characteristics of discourse from the dimension of text, an interpretation of relations between texts from the dimension of discourse practice and an explanation of relations between discourse and social



practice from the dimension of socio-cultural practice. This study was proceeded based on

the three dimensions as shown in <Figure 1>.

**Figure 1.** Fairclough’s framework of critical discourse analysis[8].

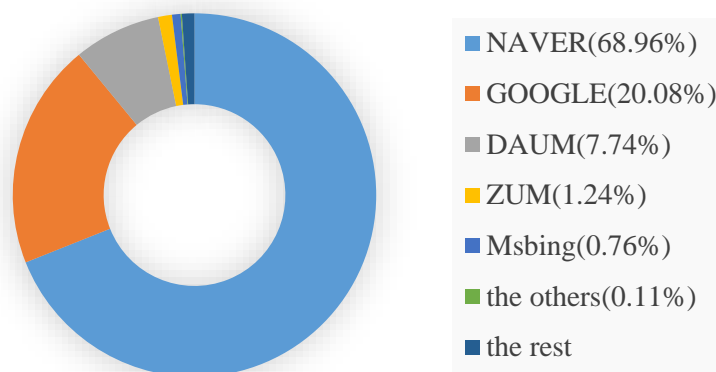


### 3. Subjects and Procedure of Analysis

This study attempted to look into discourse on child abuse found in the online child care communities and examine mothers’ perceptions of that abuse, determining implications that the discourse may have. For the move, the study tried to review materials and replies that were written and posted by members of the communities between Oct. 1,

2017 and Sep. 30, 2018. For the review, above all, this study selected a particular online child care community that seemed appropriate after considering the membership size of that community and Internet shares by major portal sites. As a result, this study finally selected J child care community with 673,742 members that is linked through Naver, a portal site that is highest or 68.96% in Internet share as shown in <Figure 2>.

**Figure 2.** Internet Shares by Major Portal Sites(2017.10.01.~2018.09.30.)[11].



### 4. Data Analysis

Online communities are where a lot of verbal interactions, discussions and discourse on a variety of issues are daily and actively made. Taking a notice of the fact, this study focused on texts regarding child abuse that are materials or replies posted in a particular online

child care community, and examined how those texts are combined into discourse on child abuse. In association, the study analyzed the texts based on the three dimensions of Fairclough’s framework of critical discourse analysis, as shown in <Table 1>.

**Table 1.** Process of Data Analysis.

Category of analysis	Key concept for analysis	Base of text analysis	Data for analysis
Description from the dimension of text	Parents' ideology as to child abuse	Words reiteratively found in discourse on child abuse, statements of experience related to child abuse found in that discourse	Materials or replies concerning child abuse that are posted in the online child care community
	Social relations in discourse on child abuse	Nurseries, kindergartens, domestic violence, family discord, CCTVs, police, reports, news articles, newspapers	
	Identity(power) of the lead in discourse on child abuse	Teachers, parents, children	
Interpretation from the dimension of discourse practice	Interpreting social situations that influence the formation of child abuse ideology		Policies, news, information or theses concerning child abuse
Explanation from the dimension of socio-cultural practice	Examining and explaining child abuse-related policies and the roles of concerned authorities		

In data analysis, first of all, this study collected texts from the selected online child care community, which are all of the materials and replies regarding child abuse posted in the same community. Next, the study sorted out words reiteratively found and unique or symbolic expressions appeared in the texts and then categorized the words and

expressions, through which some themes were drawn out. Based on those themes, finally, this study made the final categorization of discourse on child abuse as shown in <Table 2>, for which the research consulted with experts in psychological counseling for children three times over 2 weeks.

**Table 2.** Final Categorization.

Category of analysis	Category of content
Description from the dimension of text	Superficial meanings of discourse on child abuse
	<ul style="list-style-type: none"> <li>Discourse on child abuse that is formed due to distrust and concerns over early childhood education institutions</li> <li>Discourse on child abuse that is reproduced based on the consumption of others' experience</li> <li>Discourse on child abuse that is formed via mass media</li> <li>Discourse on child abuse in connection with the matter of excessive child protection</li> <li>Discourse on child abuse in connection with the matter of domestic violence arisen out of family breakage or discord</li> <li>Discourse on child abuse prevention by legal or institutional measures</li> <li>Discourse on the criticism or hatred of child abusers</li> </ul>

Social meanings of discourse on child abuse	
Interpretation from the dimension of discourse practice	<p>Discourse on the mass media image of abusive parents</p> <p>Discourse on the mass media image of abusive day care teachers</p> <p>Discourse on the situations of domestic environment including family discord</p> <p>Discourse on the matter of discipline or corporal punishment in conjunction with excessive child protection</p> <p>Discourse on child discrimination that is due to social problems like income gap</p> <p>Discourse on child abuse that is at the backdrop of socio-cultural tradition</p>
Socio-cultural implications of discourse on child abuse	
Explanation from the dimension of socio-cultural practice	<p>Discourse on legal or institutional actions for children's human rights and against child abuse</p> <p>Discourse on the need of parent education</p>

## 5. Findings

This study attempted to look into discourse on child abuse that is formed by parents in the online child care community, examine how the formation is made within socio-cultural texts and determine different meanings of the discourse. Through these moves, the study sought to raise social attention to the victims of child abuse as well as problems such as family discord that may contribute to child abuse, ultimately helping create and develop social or institutional solutions to child abuse.

The findings of the study can be summarized as follows.

First, when viewed superficially, discourse on child abuse is formed due to distrust or concerns over early childhood education institutes and in connection with social awareness concerning domestic problems such as family breakage, family discord and domestic violence. Superficially, also, that discourse apparently includes corporal punishment or discipline, which was traditionally tolerated in conjunction with excessive child protection or under the name of domestic education, in the range of child abuse. Recently, the discourse is prospering as an increasing number of experiences related to child abuse are consumed through mass media or communities.

In a similar vein, discussions as to the criticism and hatred of child abusers are being made as a part of the discourse.

Second, the social meanings of discourse on child abuse are formed in association with the mass media image of abusive parents or with a reflection of factor such as corporal punishment or discipline that may be due to poor domestic environment including family discord or excessive child protection. The mass media often focuses on domestic environment in the coverage of child abuse incidents, contributing to the negative view of broken or low-income family and to discourse that drives home an assumption that poor domestic environment like family discord is one of the primary causes of child abuse.

Third, from the view of socio-cultural practice, discourse on child abuse suggests that some actions should be taken and implemented. Those actions include establishing more powerful policies for children's human rights protection or child abuse prevention in the wake of a recent increase in child abuse incidents, increasing and expanding child protection agencies to keep the victims of child abuse from returning home and suffering the same problem again, and providing parent education that aims to recover the proper function of family under constant attention and support from communities.

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## Analysis of Domestic Trends in Research on MEDICAL TECHNOLOGISTS 2000-2017 in Republic of KOREA

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### Abstract

*Purpose; The purpose of this study was to analyze domestic trends in research on medical technologists and to suggest some of the right directions for future research on the same. Methods; As for paper retrieval, literatures were selected from the databases of Korean Education and Research Information Service(KERIS), the National Assembly Library, Koreanstudies Information Service System(KISS) and the National Digital Science Library of Korea Institute of Science and Technology Information(KISTI/NDL) and from the Journal of the Korean Association of Medical Technologists by inputting the following words: medical technology, clinical pathology, laboratory medicine tests and clinical pathology student. Out of them, 20 papers that weren't related to medical technologists were excluded, and 19 overlapped papers and two conference materials were additionally ruled out. Thus, 13 papers were selected. Results; Papers related to medical technologists started to increase in number in 2001. Six papers(46%) were written to receive a degree, and seven(54%) weren't. Seven papers(54%) that were neither theses nor dissertations were published in journals registered with the National Research Foundation of Korea, which is a renowned domestic journal, and in candidate journals for registration with it, and three(23%) that were the largest in number were published in the Journal of the Korean Association of Medical Technologists. In terms of theme, job satisfaction was covered in four(31%), and quantitative studies numbered 13(100%). Non-experimental studies numbered 13(100%). Conclusion; The effort by this study to analyze studies related to medical technologists made it possible to determine the trends in research on medical technologists and variables affecting them, and it's found that there was some room for improvement as well. In the future, ceaseless efforts should be made to produce outstanding research papers.*

**[Keywords]** Medical technologist, Research, Trend, Health and Medical Treatment, Job Satisfaction

## 1. Introduction

When it comes to recent shifts in medical environments, patient-centered services are offered to improve the quality of healthcare services and raise the satisfaction of patients who are medical consumers. Hospital employees who engaged in various professions join forces to provide patient-oriented medical services in pursuit of a common goal that is to promote the health of patients. Healthcare workers who work in hospitals have to keep adapting themselves to ever-changing medical environments due to the advancement of medicine, competition, new

diseases and diversified customer needs[1][2]. The occupation of medical technologist that is one of the members of the hospital organization is the profession that needs a national certificate[3] [4].

Medical technologists make a contribution to the prevention, diagnosis and treatment of the pathological and physiological conditions of patients and to prognosis observation as one of healthcare workers by examining specimens, and they provide accurate test results promptly to ensure reliability[5]. In addition, medical technologists who are in charge of clinical laboratory tests use microscopic sample production techniques to observe the

morphology of the cells or tissues of specimens from patients and provide reliable test results[1].

Medical technologists are instrumental in diagnosing patients and judging their prognoses as members of the departments that offer medical assistance in the field of medicine. Furthermore, it can be said that they make a great contribution to prevention and hygiene[4].

In the area of medicine, studies have been conducted to enhance the quality of laboratory medicine as medical technologies, medical equipment and the work of medical technologists have advanced, and the importance of medical technologists is lately more accentuated to improve medicine[6]. To ensure the scientific and systematic role performance of medical technologists, the prompt securement and efficient management of medical information are required[7].

When it comes to the analysis of research papers, that can be carried out in diverse ways such as analyzing overall research trends or what a particular paper is about, researching a specific theme or reaching a conclusion by piecing together all the findings. Specifically, research on trends is of importance in that it offers knowledge and information on the state of studies in a particular area in our country and what research is more needed to expedite further development both in quantity and quality[3]. Studies of medical technologists have been on the rise since 2000, but few research efforts are channeled into them in recent years. Studies that investigated medical technologists so far have dealt with various variables, and their findings might not yet be generalizable nor could be cited as evidence[1]. Under the circumstances, it's necessary to grasp overall trends in research on medical technologists in order for domestic researchers to make research on medical technologists in more diverse ways. In fact, however, no efforts have yet been made in our country to analyze trends in research on medical technologists. It's required to investigate them in association with hospital environments to extend the sphere of medical technologist research, to step up their development and to take their work to another level. Besides, diverse medical technologists should be investigated to obtain accurate information necessary for scientific and superb job performance in hospital settings[4] [8].

Accordingly, the use of the same analysis framework for research type, research design and subjects by year and the use of different analysis frameworks for research theme[9]. will makes it possible to find out trends in research on medical technologists and suggest some of the right directions for research in the future[10] [11].

The purpose of this study was to analyze the papers of research on medical technologists, which were conducted in domestic hospitals between 2000 and 2017, in an effort to provide some information on the right directions for the development of medical technologist studies.

## **2. Experimental Methods**

### **2.1. Research design**

This study is a descriptive research study to analyze domestic trends in research on medical technologists and measurement tools.

### **2.2. Data retrieval and data selection**

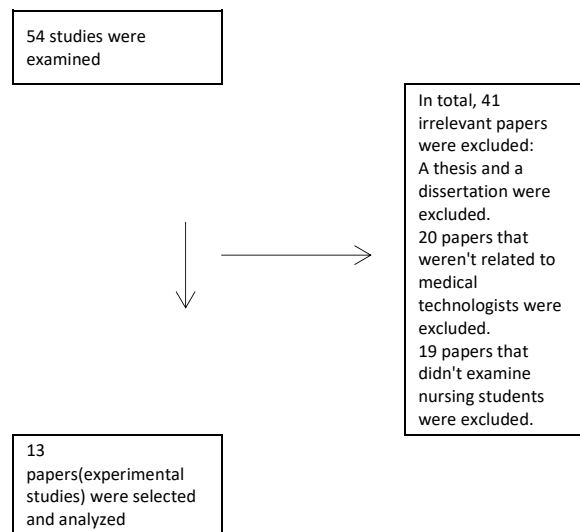
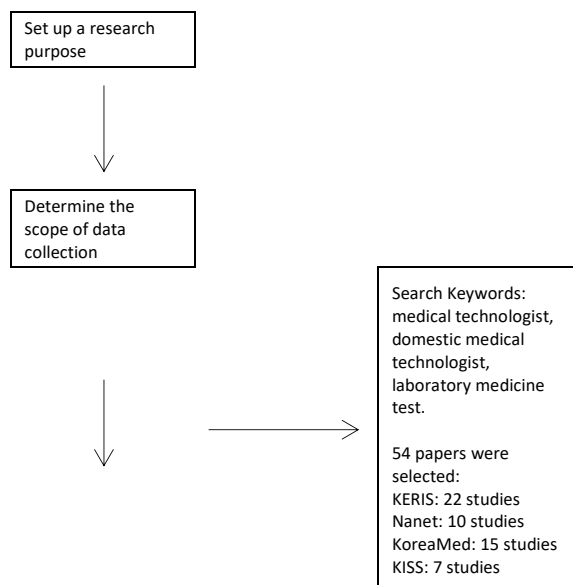
As for paper retrieval, the databases of the KERIS, the National Assembly Library, the KISS and the KISTI/NDSL and the Journal of the Korean Association of Medical Technologists were used to do searches for papers by analyzing titles, keywords and abstracts. The keywords used in this study were medical technologists, clinical pathology, laboratory medicine tests and clinical pathology students. 54 papers were discovered in total. Among them, 20 papers that had nothing to do with medical technologists were ruled out, and 19 overlapped papers and two conference materials were additionally excluded. Thus, 13 papers were selected <Figure 1>.

### **2.3. Data analysis**

The data analysis was carried out from January to May, 2018. After existing studies of paper analysis were reviewed, analysis frameworks were developed to serve the purpose of the study. And the frameworks were finalized after two clinical pathology professors

and two clinical pathology graduate students double-checked them and discussed together when there was anything that was unclear or needed to be checked. The collected papers were classified according to [12], research trend analysis criteria, and the papers were analyzed after the criteria were modified in part by this researcher. Statistical data on real number and percentage were obtained. In terms of analysis by time period, the papers were divided by five-year time period depending on when they were conducted. As to research type, they were divided into two. One was a thesis or dissertation, and the other wasn't [13]. The papers that were not theses or dissertations were classified again by the types of the journals in which they were published. In regard to research design, they were divided into quantitative studies, qualitative studies and other studies. The quantitative studies were classified into two: experimental design and non-experimental design. The studies of non-experimental design were classified into research studies and correlation studies [12]. In addition, the subjects in the papers and the types of the subjects were classified, and the major concepts, related concepts, detailed design, analysis method and instruments of the studies were analyzed.

**Figure 1.** The flowchart of the studies discovered through database searches.



### 3. Results

#### 3.1. Research types by year

Two papers (15%) related to medical technologists were written before 2000; six (46%), between 2001 and 2010; five (39%), between 2011 and 2018. There was a tendency that the papers started to increase in number in 2001 (see Table 1). When the papers related to medical technologists were classified by year into two (thesis/dissertation and others), six papers (46%) were theses or dissertations, and seven (54%) weren't. In the case of the former, the six papers (100%) were all theses. As for the latter, the seven papers (54%) were published in journals registered with the National Research Foundation of Korea, which is a famous domestic academic journal, and in candidate journals for the registration with it. Three were published in the Journal of the Korean Association of Medical Technologists, and one each was published in the Journal of the Korea Contents Association, the Journal of Korea Academia- Industrial Cooperation Society, the Journal of Clinical Laboratory Science, the Journal of the Korean Society for Clinical Laboratory Science and the Journal of Radiological Science and Technology <Table 1>.

**Table 1.** Research types by year (n=13).

Variable	Category	n(13)	%
Publication year	Before 2000	2	15%
	2001-2010	6	46%
	2011-2018	5	39%
Research Type	Thesis/Dissertation	6	46%
	Papers other than thesis or dissertation	7	54%
Research design	Descriptive correlation research study	13	100%
The name of journal	The Korea Contents Association	1	7%
	Korea Academia-Industrial Cooperation Society	1	7%
	Korea Journal of the Clinical Laboratory Science	1	7%
	Korean Association of Medical Technologists	3	23%
	The Journal of Radiological Science and Technology	1	7%
Subjects	Medical technologists	11	84%
	Clinical pathology students	2	16%

### 3.2. Analysis by research theme

The theme of the studies were analyzed by focusing on the keywords presented in the literatures. After the themes of the studies were analyzed, keywords that appeared two or more times in the studies were extracted. There were four keywords(30%) linked to job satisfaction; two(14%), to emotional labor; two(14%), to stress; one(8%), to work satisfaction; one(8%), to infection control; one(8%), to health; one(8%), to major-related satisfaction; one(8%), to satisfaction with clinical practice <Table 2>.

**Table 2.** Analysis by research theme(n=13).

Variable	Category	n	%
Independent variable	Emotional labor	2	14%
	Burnout	1	8
	Work satisfaction	1	8%
	Infection control	1	8%
	Stress	2	14%
Independent variable	Job satisfaction	4	31%
	Health	1	8%
	Major-related satisfaction	1	8%
	Satisfaction with clinical practice	1	8%

### 3.3. Analysis by research design

As to the distribution of research designs, the quantitative studies numbered 13(100%), and the non-experimental studies numbered 13 (100%). All the studies were non-experimental research. The non- experimental studies were descriptive ones that numbered 13(100%). The theses were non-experimental research, and all of them were descriptive ones that numbered six(100%) <Table 3>.

**Table 3.** Analysis by research design(n=13).

Variable	Category	n(13)	%
Research design	Descriptive correlation research study	13	100%

### 3.4. Data analysis and results

As for data analysis, mean, standard deviation and frequency analysis of descriptive statistics were used in every study, and t-test was conducted in 11 papers(84%); ANOVA, in 11(84%); Pearson correlation coefficient, in 11(84%); reliability analysis, in 11(84%) <Table 5>. The descriptive studies numbered 13(100%). Regarding the major concepts of the descriptive studies, job-related health was covered in five papers; job satisfaction, in three; organization and personality, in one; satisfaction with the department of clinical pathology, in one;



satisfaction with clinical practice, in one; mental stress, in one; and awareness of the profession, in one;. The most common subjects in the studies whose major concepts were related to health were medical technologists, and the most common subjects in the studies that dealt with job satisfaction were medical technologists as well <Table 5>.

**Table 4.** Data analysis(n=13).

Variable	Category	n	%
Data analysis	t-test	11	84
	ANOVA	11	84
	Pearson correlation coefficient	11	84
	Mean, standard deviation	13	100
	Frequency	13	100
	Duncan test	1	8
	Multiple regression	8	15
	Factor analysis	1	8
	Crosstabs	1	8
	Reliability analysis	11	84
	Hierarchical regression	2	15
	Tukey test	1	8
	X2-test	3	23
	Two-way ANOVA	1	8
	Stepwise multiple regression	1	8

**Table 5. Results(n=13).**

Paper design	Title	Published year	Source	Subjects	Instrument	Data collection	Key research results
Descriptive research Non- experimental research	The Medical Professionalism and Organizational Performance of Medical Technician in Hospitals	2013	The Journal of the Korea Contents Association	437 physical therapists, radiologists, medical technologists and occupational therapists	Establishment as a profession, a sense of calling, occupational organization, high educational level, service orientation, autonomy	Self-administered survey	The job competency and job significance of the medical technicians, the appropriateness of their pay and their job autonomy significantly varied with gender and age group, and job differed significantly according to age. There were significant differences in organizational performance and workplace attachment according to the appropriateness of pay and the years of service.
	Relationships of Emotional Labor, Job Satisfaction and Burnout among Medical Technologists in a University Hospital	2014	The Journal of Korea Academia-Industrial Cooperation Society	150 medical technologists	Health, occupational characteristics, emotional labor, job satisfaction	Self-administered survey	As for the results on sociodemographic characteristics, health-related behavior, emotional labor and job satisfaction, emotional labor was more influential than job satisfaction. Therefore the management of the emotional labor of medical technologists seems necessary.
	Research on working environment of medical technologists in the Electrophysiology laboratory	2002	The Korean Journal of Clinical Laboratory Science	109 medical technologists	the medical technologist system, infection control	Self-administered survey	Colleges should provide sustained education for medical technologists to perform physiological testing, and thorough infection measures should be taken to improve working environments to minimize their exposure to the danger of infection.
	An experimental study on job stress for the efficient use of human resources	1988	The Journal of Korean Association of Medical Technologists	273 medical technologists	Stress	Self-administered survey	There were a negative correlation between fatigue and communicative competency, a positive correlation between fatigue and stress from clinical practice and a negative correlation between communicative competency and stress.
	A Survey on Medical Technologists' Job Satisfaction	1987	The Journal of Korean Association of Medical Technologists	1,000 medical technologists	Pay, promotion, work environments, satisfaction with doctors	Self-administered survey	Satisfaction with pay levels was low regardless of all the variables, and the subjects who were 51 years old, who were female, who were unmarried and who received high-school or higher education were more satisfied with promotion. As for working environments and conditions, the subjects who were older, who were female, who were married and who worked for 10 years or more were more satisfied. Concerning relationship with doctors, the subjects who were older, who were male, who were married and who worked for 10 years or more were more satisfied.
	Research on the WRMD (Work Related Musculoskeletal Disorders) in Medical Technologists Who Work in Gwangju City and Jeollanamdo Province	2008	The Journal of Korean Society for Clinical Laboratory Science	74 medical technologists	Work-related musculoskeletal disorders of workers doing simple repetitive work	Self-administered survey	Work-related characteristics were more important than personal characteristics or health-related ones. To prevent medical technologists from contracting musculoskeletal diseases, the regulation of work intensity and working speed and enough time for rest seem to be necessary.

Comparison of Satisfaction on Major Departments of Health-Related Universities Located in Busan and Gyeongnam	2011	The Journal of Radiological Science and Technology	107 healthcare students, 97 clinical pathology students, 89 physical therapy students	Consist of three on general characteristics, 11 on major-related characteristics and 26 on satisfaction with major.	Self-administered survey	As for the major satisfaction of every subject, they were sort of satisfied in general. To be specific, social status was most satisfactory and environments were least satisfactory in every department. The satisfaction levels were higher in the three-year universities than the four-year ones. In the departments of clinical pathology, the school system and social status affected major satisfaction, and adjustment to the department was influential in the departments of physical therapy. Job prospects had a significant impact on major satisfaction in every department.
Factors Related to Clinical Laboratory Students' Satisfaction with Clinical Clerkship	2013	A thesis at Chonnam National University Graduate School	127 students who finished clinical practice in hospitals including general hospitals and university hospitals	Four items on general characteristics, overall satisfaction with clinical practice after that.	Self-administered survey	As for the satisfaction of the students with clinical practice, overall satisfaction with the practice was the highest, followed by the content of clinical practice, time, interpersonal relationship, environments, field, guidance and evaluation.
Employment stress and physical and mental symptoms of healthcare college students	2009	The Graduate School of Health Science at Kyungpook National University	Clinical pathology, radiology, physical therapy and dental hygiene students	The instrument used to measure mental symptoms and somatization was the Korean version of Symptom Checklist-90- Revision.	Self-administered survey	The most critical factor for the employment stress of the healthcare college students except the male ones was department. And employment stress was closely linked to psychological health and physical health.
A study on the job satisfaction of university hospital medical technologists	2003	The Graduate School of Administration and Social Welfare at Daejeon University	Medical technologists in general hospitals located in Daejeon and Jeollabukdo Province	Job satisfaction, work environments, sociodemographic factors	Self-administered survey	The satisfaction of the medical technologists with their job was low. Concerning their satisfaction with job factors, promotion was most satisfactory, followed by welfare/pay, equipment and work.
A comparative analysis of working conditions and job satisfaction among medical technologists in hospitals and neighborhood clinics	2001	The Graduate School of Environmental Health at Chosun University	Medical technologists in university hospitals and general hospitals located in Gwangju and Jeollanamdo Province	Job satisfaction index, job satisfaction- dissatisfaction factors	Self-administered survey	The job satisfaction of the medical technologists was under the influence of general characteristics including workplace, age, marital status, religion, position, working hours and turnover experience.
The influence of medical technologists' job satisfaction and emotional labor on their turnover intention	2005	Kyungpook National University Graduate School	Medical technologists in small, mid-sized and large hospitals in two metropolitan cities and a province	Influence of general characteristics and job characteristics on turnover intention, the correlation of the independent variable job satisfaction to the dependent variable turnover intention, and the influence of the former on the latter	Self-administered survey	A hierarchical multiple regression analysis was made over two different models to determine the explainability of the independent variables that affected significantly turnover intention as the dependent variable. As a result, the explainability of the model that only dealt with general characteristics and job characteristics increased from 16.0% to 37.3% when job satisfaction and emotional labor were added to that. It shows that job satisfaction and emotional labor exerted an influence on turnover intention.
Factors related to the subjective fatigue symptoms of medical technologists in some university hospitals	2002	The Graduate School of Industrial Health at the Catholic University of Korea	275 medical technologists in some university hospitals located in Gyeonggi Province	Subjective fatigue symptoms, general characteristics, occupational characteristics, subjective evaluation of working conditions	Self-administered survey	The most significant variable that explained fatigue when the fatigue-causing factors were inputted stage by stage was comfort, followed by ventilation, gender, regularity of meals, noise, sleep hours, whether to work out regularly or not, the number of days off and room temperature.

## 4. Discussion

The sphere of medicine and health management has gradually been more segmented and specialized along with the rapid advancement of medical technologies and the shifts of healthcare environments, and the roles and functions of medical technologists who are in charge of all sorts of clinical laboratory tests as one of medical technicians are increasingly stressed to provide quality healthcare services[1].

Clinical laboratory science deals with how to develop methods and techniques to make physiological, biochemical, physiochemical and molecular analyses of clinical specimens from the examinee and how to maintain analysis instruments, and that is an applied science to research the field of medical technology, which is one of the fundamental areas of medicine, by developing diagnostic agents and new technologies. Studies of this field have mostly examined how to analyze clinical specimens. In fact, however, not many studies have yet investigated medical technologists who perform these testings[6].

The findings of the study show that studies related to medical technologists had a tendency to be on the steady and rapid rise since the 1990, though few studies had been implemented in the late 1980s. It implies that there was continuing concern for the occupation of medical technologist and its establishment as a profession, because the operational regulations of the professional medical technologist systems for each field have been established since September, 2009, as to qualifications for application, the number of required hours for education, qualification examinations and the maintenance of qualification to provide education on up-to-date academic information[14]. It could be said that this phenomenon reflected social needs and rapidly growing concern for this occupation. Thus, it was ascertained that the necessity of prolonged research on medical technologists is

emphasized[15].

According to the findings of the study on research design, the research studies or the non-experimental studies that were correlation studies were most common. The finding that the non-experimental studies were large in number seems to signify that the most fundamental research is needed above all, and studies should be implemented in diverse ways in addition to fundamental ones. Besides, experimental and qualitative research should be conducted to produce more comprehensive results on medical technologists. Recent qualitative studies haven't investigated medical technologists, but it's still not too late to formulate strategies to inform the possibility of qualitative research on medical technologists and step up the vitalization of it. For instance, it's recommended that a conference should be hosted by the Korean Society for Clinical Pathology[5].

As for data collection, the self-administered questionnaire method was used a lot. It can be interpreted that it is associated with the finding that in terms of research design, research and correlation studies were most dominant.

The subjects were mostly medical technologists who worked in university hospitals, and medical technologists all over the country were investigated. In the future, medical technologists in neighborhood clinics, small or mid-sized hospitals and large hospitals should be all examined, and whether there are any differences among them according to their years of service also should be researched[15].

As it's not confirmed whether any of the papers went through the institutional review procedures of an institutional review board(IRB), educational programs should be provided on a regular basis to foster researchers' awareness of research ethics, and an effort to make the IRB procedures settle down should be made.

This study analyzed the establishment of medical technologist as a profession/a sense of calling/autonomy, job satisfaction, emotional

labor, burnout, job environments, turnover intention, fatigue and stress, etc. The variables that were confirmed at present also were found to be considered important during the job performance of medical technologists. In the future, it's needed to take a look at more diverse variables other than these ones.

## 5. Conclusion

This study attempted to make a comprehensive analysis of literatures to analyze studies of medical technologists by using the selected analysis frameworks. The effort by this study to analyze the trends in research on medical technologists over 17 years made it possible to provide information on how to make more productive research into medical technologists. In addition, the tendency of the studies on medical technologists and the variables affecting them were verified, and it also was ascertained that there was room for improvement. In the future, constant research efforts should be made to produce outstanding research papers.

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## The Policies of South KOREA's Counter Intelligence Agency on North Korea's ESPIONAGE Activities in South Korea

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### Abstract

*At the present, South Korea 's security is as urgent as North Korea's denuclearization because North Korea's espionage is very active.*

*The core to espionage in Korea is that, since the Korean War following the invasion of North Korea, most terrorist activities and espionage activities have been executed by North Korea, anti communist investigation has targeted the North Korean regime.*

*However, while South Korea underwent a democratic regime transfer, some regimes have been friendly to North Korea according, and counter intelligence agency dealing with intelligence on North Korea caused rapid changes to power transfer, reduction of organization, and personnel, so it is not possible to pursue the policy of counter intelligence activities coherently.*

*Therefore, in this study, I have examined the security strategy of the Korean counter intelligence agency against North Korean espionage activities for college students majoring in security at Korean universities at the present time starting with the incident of a North Korean female spy, who was disguised as an employee for a cafe located in Gyeongsan-shi, Gyeongbuk and who was arrested after handing over the intelligence gathered on North Korean defectors to North Korea in 2014.*

*First, South Korea's counter intelligence manpower should be increased.*

*Second, the legal grounds for South Korea's counter intelligence activities should be further expanded.*

*Third, it is necessary to develop various techniques of counter intelligence activities in South Korea.*

*Fourth, the scope of counter intelligence activities should be expanded in Korea.*

*Fifth, South Korea's counter intelligence education should be expanded.*

*Sixth, South Korea's counter intelligence agencies should expand investigative cooperation.*

*As a result of the study, I was able to derive such results and have presented directions for North Korea's espionage activities based on the political environment in Korea.*

**[Keywords]** *Korea's Counter Intelligence Agency, National Security, North Korean Spy, Anti-Communist Investigation, Terrorism*

### 1. Purpose of Study

Since the beginning of the Cold War after 1991, the concept of security has changed as the global order was formed based on great powers. During the Cold War era, the threat of military confrontation became a key issue of national security, whereas in the post Cold War era, it began to change from military security to comprehensive security.

After the end of the Cold War, the conflicts caused by ideological confrontations among nations have declined, yet strange conflicts have emerged in other forms such as race, ethnicity, religion, and border issues. They have increased since the end of the Cold War relative to the Cold War in its most extreme situations. The reality of security following changes in international relations is increasing the threat of terrorism and security has become an even more important issue.

The key to national security is counter intelligence, which is even more important in such a divided nation as South Korea. This is because the failure of counter intelligence is directly connected to the existence of the state and may not be recoverable[1]. Since the Korean War, North Korea has engaged in espionage activities, including approximately 3,000 terrorist attacks in Korea.

From approximately 15 years ago, North Korea's suppression of human rights and the failure of its economic policies yielded a surge in the number of people leaving North Korea, and the spies who disguised their identity among North Korean defectors are arrested in South Korea.

Then South Korea's counter intelligence agencies should be more active in defense against such issues, however, the current South Korean regime limits the domestic activities and investigative rights of the counter intelligence agencies in South Korea.

Therefore, the purpose of this study is to explore the policy of the Korean counter intelligence agency against North Korea's espionage activities in South Korea.

## 2. Previous Studies

Since the Korean War on the Korean peninsula, innumerable espionage activities have taken place continuously, threatening the national security of South Korea. Therefore, this study has dealt with the policy issues of South Korean counter intelligence agencies as a key topic. The following <Table 1> summarizes the previous studies undertaken.

**Table 1.** Previous studies.

Researcher	Key details of previous studies
Lee (2017)	Examining the history of intelligence activities, innumerable intelligence agencies have integrated sex into espionage, and in particular, in the case of communist countries such as North Korea, China and Russia, sexpionage combining sex and espionage is in practice. Claimed the need for the accumulation of systematic data on the cases of sexpionage, special control of public officials such as those of the national security

	area, and counter measures against counter intelligence agencies to counter respond to it[2].
Park (2016)	Claimed that since the development of communication technology in Korea and the emergence of new communication devices influenced to make espionage even more convenient and safe, legal basis for investigations of espionage communication activities by North Korea is necessary[3].
Choe (2016)	Claimed that since the 1990s in Korea, sharing of North Korea intelligence by and among counter intelligence agencies has not been active following changes in North Korea policy and issues have arisen in collaborating with the US[4].
Han (2008)	Claimed that the roles of counter intelligence agency are critical since Korean Presidents after the Cold War have based their decisions on the intelligence provided by counter intelligence agencies concerning national security[5].
Lim (2006)	Analyzed and discussed areas of tasks for Korea's counter intelligence agencies following the diversification of intelligence activities due to internationalization and open door policy while security is an important activity goal for counter intelligence agencies in Korea given its state of division of the peninsula[6].

## 3. Research Method

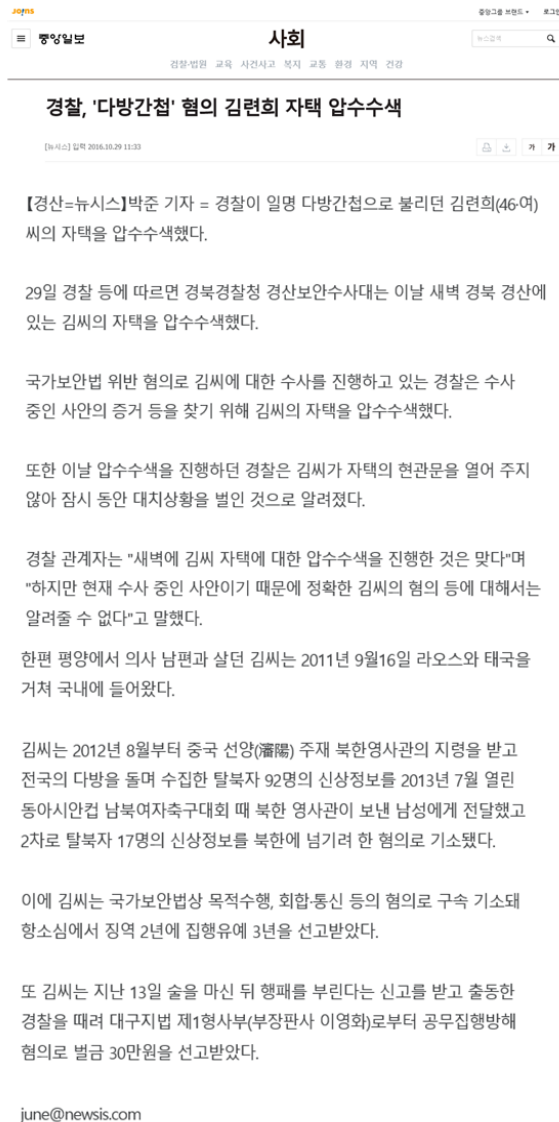
### 3.1. Research questions

Currently, the North Korean spies active in Korea were estimated to be 28,000 resident spies in the 1980s, but the number has rather increased after the Cold War, and so the role of the South Korean counter intelligence agencies has become very critical.

Therefore, the background of research questions for this study is the case of a North Korean female spy, who was disguised as an employee for a cafe located in Gyeongsan-shi, Gyeongbuk and who handed over the intelligence gathered on North Korean defectors to North Korea following North Korea's instructions in 2014, and in this study, I have also explored the tasks of South Korean counter intelligence agencies with college students majoring in security at Korean universities. The following <Figure 1> is a news article which provides the background for the questions of this study[7].



**Figure 1.** Background of research questions.



### 3.2. Research method

The study on the policy of the South Korean counter intelligence agency against North Korea's espionage activities in South Korea, which is the subject of this study, has not been conducted anywhere else yet, so it carries a strong character as an explorative study. In general, however, qualitative research methods are more appropriate for explorative approaches like this. Therefore, in this study, I have conducted a Focus Study Interview which is one of the qualitative research methods appropriate for this explorative

study. The data derived from group interviews were terminated when the contents were duplicated and new contents were not found.

The collected data as such was transferred into documents, and the data were categorized by content analysis and were analyzed by the Narrative Analysis. The following <Figure 2> illustrates the group interview at the time it was conducted.

**Figure 2.** Focus study interview.



### 3.3. Research participants

Participants in this study were selected by the Purposive Sampling. This is one of the sampling methods of qualitative research and is also known as a method for selecting the subjects which can provide rich and in depth data on the subject which the researcher desires to study.

Therefore, this study was conducted from March 2015 until June 2018 for a total of 200 students, each of which consisted of 50 college students majoring in security at universities in Korea. The group interviews which took 60 minutes on average were conducted 12 times by utilizing their classroom hours. The following <Table 2> illustrates the information of the research group.

**Table 2.** Focus study interview group's information.

Name of School	Major Program	Address	Website
Kyungwoon University	Aviation Safety Protection Science	730, Gangdong-ro, Sandong-myeon, Gumi, Gyeongbuk, Republic of Korea	http://www.ikw.ac.kr/

Keimyung University	Police Administration	1095 Dalgubeoldaero, Dalseo-gu, Daegu, Republic of Korea	<a href="http://www.kmu.ac.kr/">http://www.kmu.ac.kr/</a>
Daegu Haany University	Police Administration	1 Haanydaero, Gyeongsan-si, Gyeongsangbuk-do, Republic of Korea	<a href="http://www.dhu.ac.kr/">http://www.dhu.ac.kr/</a>
Kaya University	Police Administration	208 Samgye-ro, Gimhae-si, Gyeongsangnam-do, Republic of Korea	<a href="http://www.kaya.ac.kr/">http://www.kaya.ac.kr/</a>

## 4. Research Result

In order to conduct a study on the policy of the counter intelligence agency against North Korea's espionage activities in South Korea, I have conducted a study on the Focus Study Interview, and as follows, I have analyzed the contents of the interviews and categorized them while providing key details.

### 4.1. Manpower

In order to find more intelligence and access small intelligence, I also think that we should train secret agents like North Korea for national security and send them to North Korea and China(W\_SYS).

Security guard for sea, land and air should be strengthened against North Korean infiltration into South Korea and inspection should be conducted thoroughly by increasing the manpower for the teams in charge of cracking down on the spies in South Korea (M\_LGH).

### 4.2. Laws

To protect national security, sacrifice the people is also needed. When the National Intelligence Service and the investigative agencies are needed, the laws should be amended to expand the scope of duties for counter intelligence agencies and the investigative agencies so that the mobile phone tapping can be legalized(W\_BHJ).

It is necessary to have a legal basis to find the routes which the spies use and thor-

oughly monitoring them, prevent them in advance, and conducted highly sophisticated investigation in the event of North Korean defectors' entry into South Korea(M\_BS).

A revalidation system for detecting spies under disguise should be supported by the legal basis for national security(W\_CSJ).

### 4.3. Technique

Even if it is found according to the basic principle of counter intelligence, arrest is not immediately executed, but only after identifying the organization behind(M\_KJS).

To perform counter intelligence tasks, North Korea's policy information must be obtained and used as a technique for counter intelligence(M\_CHJ).

### 4.4. Scope

I think that we should strengthen the security work and strengthen security guard for important national facilities(W\_LSR).

A thorough investigation of North Korean defectors and long term observation and monitoring are necessary(M\_AYJ).

### 4.5. Education

Education of the risk of espionage activities should be conducted at elementary schools, junior high schools, high schools, and universities regularly, and the importance of national security and the types of activities that are specific to spies should be informed (W\_CSH).

Regularly educate the staff of the counter intelligence agencies on the changing situation of the North Korean spies and strengthen the on the job test and evaluate the personnel based on it(M\_LJH).

### 4.6. Collaboration

Build a network system to oversees all investigative agencies in Korea with the aim of investigating North Korea's spies and share counter intelligence strategies(M\_LJH).

The key to the espionage investigation depends on the foreign intelligence network, so build a collaborative investigative system

with the allied countries such as the United States and Japan(W-JBA).

## 5. Discussion

As for espionage activities in North Korea since the Korean War, most terrorist activities and espionage activities have been carried out by North Korea, so the anti communist investigation is focused on the North Korean regime.

In South Korea, however, it seems that a proper investigation has not been conducted on the basis of the atmosphere of reconciliation with North Korea in the political realm, even after identifying North Korea's espionage activities in South Korea. The following <Figure 3> illustrates Seoul in violation of the National Security Act of South Korea [8].

**Figure 3.** Appearances of Seoul Violating South Korea's National Security Law.



In addition, some media have advocated such illegal activities.

In particular, the present Korean regime proposed the suspension of the counter intelligence activities for transferring the right of investigation from the National Intelligence Service, which is South Korea's intelligence agency, to the police as a promise for the presidential election.

However, the issue with this policy lies with the question of how can the police, which operates within the boundaries of the law, arrest North Korean spies operating outside the law? And the anti communist investigation needs to have an overseas intelligence network, yet how can the police constrained within South Korea track down the

North Korean spies?

The following <Figure 4> is a press release in Korea on the closing on domestic part of the National Intelligence Service, South Korea's intelligence agency, and the transfer of the anti communist investigation right to the police[9].

**Figure 4.** Press release on the closing of domestic part of South Korea's counter intelligence agency.



정부가 대공수사권을 경찰에 이관하는 내용이 담긴 국정원법 개정안을 이번 정기국회에서 조속히 처리하기로 뜻을 모아 논란이 거세다.

당정청은 14일 여의도 민주연구원에서 비공개 협의를 열고 이 같은 방침을 정했다. 야당의 반대로 여권 일각에서 검토되던 '3년 유예' 안에 대해서는 '염두에 두지 않고 있다'고 뜻을 밝고 나섰다. 이 자리에는 청와대 조국 민정수석도 참석했다.

해당 법안은 국정원의 명칭을 '안보정보원'으로 바꾸고 대공수사권을 경찰로 이관하는 내용을 담았다. 민주당 김병기 의원이 올해 1월 발의한 국정원법 전면 개정안이다. 이에 대해 자유한국당과 바른미래당은 반대 입장이 여전한 상황이며서 이번 정기국회 내에 처리는 쉽지 않을 것으로 전망된다.

정부가 대공수사권 폐지 가속화 움직임에 대해 국내 북한 전문가들은 일제히 반발했다.

In addition, while Korea is currently in a state of truce, the political realm and the media are reporting as if reunification with North Korea will soon take place, and they are voicing opposite to the United States, an ally of South Korea, in the international community.

In addition, despite the current conflict between the United States and North Korea owing to North Korea's development of nuclear weapons, there are forces in South Korea which insist on the withdrawal of the US

armed forces in South Korea<sup>1</sup>, abolition of the National Security Act<sup>2</sup>, and the dismantling of the National Intelligence Service<sup>3</sup>.

Therefore, we must know how broadly the North Korean followers in Korea are located, among which the key is to preserve the South Korean counter intelligence agencies which fight against the North Korean communist regime.

Lastly, South Korea needs to reconsider Vietnam's unification under communism in history.

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- North Korea's Cyber Attack Terror Cases and Cyber Capabilities and Current State of Affairs of North Korea's Cyber Terror Force, *International Journal of Military Affairs*, 1(2) (2016).
- Establishment of Private Investigation Service Supervising Authority: National Police Agency, Ministry of Justice, and National Intelligence Service, *Journal of Korean Public Police and Security Studies*, 14(1) (2017).

#### Major career

- 2006~2009. Republic of Korea National Assembly, Secretary
- 2012~present. Kyungwoon University, Professor
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<sup>1</sup> The United States Forces Korea, or the USFK, is a US force located in the Republic of Korea. It has a legal status within Korea by the ROK-US Mutual Defense Treaty and the U.S.-South Korea Status of Forces Agreement. Korea was freed from Japan after Japan collapsed by the US use of nuclear weapons in mainland Japan in 1945, but the North and South Korea were divided by Yalta Conference. However, in 1948, as the requirement for the establishment of a democratic government by the Republic of Korea were made available, the US military withdrew, and on June 25, 1950, at 4:00AM, North Korea invaded to trigger the Korean War, and ever since, North Korea was taken to be South Korea's enemy. And to prepare for such an invasion of North Korea and to maintain peace, the US armed forces began its stay.

<sup>2</sup> The National Security Act was enacted on December 1, 1948, with the aim of regulating the activities of anti state organizations that jeopardize the free and democratic basic order in the Republic of Korea based on Japan's the Maintenance of the Public Order Act.

<sup>3</sup> The National Intelligence Service is the central administrative agency of the Republic of Korea, responsible for intelligence, security and criminal investigations related to national security.