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An Empirical Study on the Intention to Use Untact Drug Delivery Service Application by Applying the Extended Technology Acceptance Model

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Abstract. This study verified the intention to use the Untact drug delivery application based on the extended technology acceptance model (TAM). To verify the study, the researcher conducted a survey of 349 Koreans who have experienced self-isolation in accordance with measures to prevent COVID-19 and infectious diseases. The collected data was analyzed using the structural equation model (SEM). This study clearly identified the intention of users to use the Untact drug delivery service in the current situation where research on Untact drug delivery applications is lacking. In addition, based on this, factors that promote and hinder users' intention to use when introducing IT-based Untact medical services were identified. Furthermore, it is significant in that it contributed to the development of the theory by expanding and applying the technology acceptance model according to the characteristics of the industry. Summarizing the study results, it was confirmed that the majority of survey participants intend to use the non-face-to-face drug delivery application if all conditions are met. In addition, among the five hypotheses established by the researcher, the perceived usefulness and perceived ease of use, the same as in previous studies, were found to have a positive (+) effect on the intention to use, but the remaining three variables were Contrary to the hypothesis, it was found that there was no significant effect on intention to use. Based on the results of the study, implications, limitations of the study, and future research directions were presented. It is hoped that this study will contribute to the non-face-to-face drug delivery service and further, to legalization and deregulation of the entire telemedicine industry in Korea.

Keywords: Untact, Drug delivery service, Application, TAM, Telemedicine

1. Introduction

With the development of ICT, and the influence of untact trends upon the outbreak of COVID-19, the practice of telemedicine is becoming a global norm. Patients communicate with medical staff through their smart phones and wearable devices, and with logistical infrastructure based on cold-chain, patients have better access to medicine and medical supplies. The effectiveness and efficiency of telemedicine will be ever growingly notice verified day by day, and telemedicine is expected to become a huge wave of innovation that can no longer be avoided. (Dorsey&Topol, 2020)
According to statistics released by the Grand View Research (2020), the global telemedicine market is expected to reach USD 155.1 billion in size by 2027, with a predicted CAGR of 15.1%. As a result, authorities and companies in the medical field around the world are executing large lumps of investments in the telemedicine industry. For instance, in the case of the United States, they established a digital health center under the Food and Drug Administration (FDA) in September 2019, and various plans are under design at the policy level. China is also working to expand it is market size through policies regarding online medical examinations, sales of prescription medicine, and remote application of medical insurance. In the United States and Britain, DocGo, a service that combines medical care, mobility, and ICT, is rapidly growing. DocGo offers visiting medical services, by employing thousands of medical staff for the service. It offer mobile-based untact telemedicine, and medical services at the patient's home or workplace. Additionally, According to the data released by Market Research Update in 2021, Zipline, a company that provides medicine and medical supplies to patient through drones, is showing rapid growth. The drone has a camera and a display screen, allowing customers to communicate with medical staff. Infrastructure has been established for the patient to receive remote medical treatment and medicine through drones. With such market conditions, there is an increasing interest for investments in relevant fields as well, and this reflects investors' confidence regarding the growth potential of the field. According to CB Insight, an investment information company, According to data announced by CB Insight (2021), Global telehealth investment rose for the fourth consecutive quarter, growing 17% QoQ and 169% YoY to reach a record high of $5B across 163 deals (+6% QoQ and -4% YoY). The top 5 deals alone were worth $1.6B (representing 30% of Q2'21 funding).

However, the situation in Korea is completely different. Under current medical laws in Korea, it is illegal for medical staff to remotely treat their patients. In February 2020, the government temporarily allowed it in order to prevent the spread of COVID-19 in medical institutions, but even then, it was allowed only at a rudimentary level compared to treatment taking place overseas, and the growth of relevant industries was unclear, as there was strong opposition from other interested parties(Hun-Sung Kim, 2021). In the case of drug deliveries, while applications such as 'Dr. Now' and 'OlaCare' were released to provide untact drug delivery services,

with boycotts regarding concerns of side effects that could take place as a result of drug deliveries, the services have essentially flatlined. It is a shame that Korea, a country equipped with the world's best delivery infrastructure and ICT technology, is regressing due to regulations and collective selfishness.

In such domestic situation, where there is a lack of legal foundation, research was conducted on activate telemedicine services, potential users (Suk Jin, 2020; Youngim Bae et al., 2020) and service providers in the medical industry (Soomin Kim&Changwon Lee, 2013) to discover intentions of telemedicine use.

Additionally, despite the proven benefits, telemedicine can be considered a useful service only when used by patients. Therefore, it is emphasized once again that in order to promote the adoption of telemedicine services among the general public, it is necessary to analyze the factors affecting their perceptions first. Thus, the purpose of this study is to expand the Technology Adoption Model (TAM) into an optimized form for the telemedicine industry in Korea and conduct a survey based on this, focusing on identifying major facilitating and hindering factors of telemedicine services. Moreover, it aims to ultimately prove, through objective data, that the Korean people desire the implementation of telemedicine, and based on this, the study aims to lead the deregulation of telemedicine in Korea.

In order to solve the current health insurance financial problem and prepare for future population crises such as an aging population, the introduction of non-face-to-face drug delivery is not an option but a necessity. It is hoped that the efficiency of the medical system can be secured. So far, research on non-face-to-face drug delivery applications in Korea has not been conducted. Prior to the legalization and generalization of non-face-to-face drug delivery applications, it is a very important research topic to identify potential users' intention to use the drug delivery service and influence factors. It is necessary to identify in advance the perceptions they have and to review in advance which part should actually be supplemented or which part should be emphasized. Considering these points, it is hoped that this study will have a positive effect on the development of prior theories.

2. Review of Prior Theories & Setting Hypotheses

2.1 Untact Drug Delivery Application (App)

According to relevant laws and regulations and data from relevant organizations, telemedicine can be defined as follows: First, in Article 34 of the Medical Law of the Republic of Korea, it defines telemedicine as an act in which medical personnel (limited to doctors, dentists, and oriental doctors who practice medical treatment) provide medical knowledge or technology to medical personnel in remote locations using information and communication technology. It can be said that telemedicine sets the scope of consultation for only medical personnel, not patients or the general public. (However, due to the COVID-19 outbreak, as of May 22, untact treatment is temporarily allowed to patients). On the other hand, most countries that implement

telemedicine, provide the service to patients. The U.S. Department of Health and Resources Services (HRSA) defines telehealth as the use of information technology to support public health, health-related education, and health management for patients, health care providers, and remote medical institutions. The definitions of telemedicine in other countries that allow it, such as Japan, Europe, and Australia, are also very similar, and the services all target patients (Joonhyuk Koo&Kinam Jin, 2021).

In the case of untact drug delivery, which is the subject of this study, it is definition has not yet been clearly defined, and prior research regarding this topic has hardly been conducted. However, according to the introduction section on the website of a drug delivery application company, OlaCare, the service is provided through the following process: First, the patient selects the medical department/time/method of receiving medicines/payment methods through the drug delivery application, and applies for treatment after describing his symptoms and filling out his personal medical information. After that, untact treatment is conducted through video calls with medical staff, and a prescription is sent to a pharmacy. According to the transmitted prescription, the pharmacist dispenses the medicine and delivers the it to the patient through quick delivery or parcel services.

2.2 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is a model that describes the entire process from user acceptance to use of new information technology. It is theoretically based on the theory of planned behavior (Azjen, 1991) and rational behavior theory (Azjen, 1980), developed to predict and understand the behavior of a specific individual based on social psychology. Davis et al (1989), who proposed the technology acceptance model, questioned whether users accept or reject information technology for what reason, and argued that perceived usefulness and perceived ease of use affected people’s attitude in accepting new technology and their intentions of use. Additionally, it was argued that the intention to use is a key factor influencing an individual's actual behavior.

Davis et al (1989) argued that perceived usefulness is the degree to which a person believes that accepting and using a particular technology will improve performance. On the other hand, perceived ease of use is the degree to which users perceive that they can acquire and use new technologies effortlessly. An individual's attitude toward use is determined by the perceived usefulness and perceived ease of use of a particular technology, and can be viewed as a degree of positive or negative evaluation or judgment on a certain behavior. In the use of new technology, the intention to use refers to the level of an individual's willingness to perform a certain action to achieve a specific goal, and the actual action indicates whether the user accepts and uses the new technology. Meanwhile, in previous studies conducted by Venkatesh et al. (2000), it was discovered that there is a strong positive correlation

between consumer intention to use and actual behavior.

From a different perspective, various previous studies (Y Yi Mun et al., 2006; Patrick YK. Chau, Jen-Hwa Hu Paul, 2002; Viswanath Venkatesh et al., 2003) have expressed concerns in using the TAM to explain intentions to use in health care-related information technology. This is because the user's intention to use a specific service such as telemedicine, cannot be sufficiently explained with only a few variables. In other words, the use of telemedicine services among people can vary according to various social and behavioral factors that are not in the existing TAM model. In this regard, previous studies have emphasized that various factors such as social influence and facilitation conditions can significantly change user behavior toward acceptance and intentions to use new information technology.

Most of the prior studies conducted domestically, that applied the technology acceptance model to the field of telemedicine, focused only on the doctor's telemedicine, just as studies conducted overseas. In addition, so far, there are not any studies that identified the intention of using untact drug delivery applications in Korea. Therefore, it is necessary to conduct research on telemedicine services from more diverse perspectives.

Therefore, this study intends to investigate the intention to use untact drug delivery applications in order to obtain broader insights on the intention to use telemedicine services. In addition, variables such as stimulation conditions, trust, and protection of personal information were included in the existing technology acceptance model to improve the model's completeness.

2.2.1 Perceived Usefulness / Perceived Ease of Use

Perceived usefulness and perceived ease of use are the most common components of the technology acceptance model and act as important determinants of users' acceptance of new information technology (Whitten et al, 2004). Accordingly, it has been used in various previous studies to identify the intention to use telemedicine services (Youngim Bae, Haerie Shin, 2020 et al.).

First, regarding perceived usefulness, Wilson&Lankton (2004) argued that perceived usefulness had a significant positive effect on intention to use in a study on the acceptance of e-mail-based hospital/clinic online reservation systems. Rahimpour et al., (2013) derived the same study results through a study on the use of a telemedicine systems at home in patients with chronic obstructive pulmonary diseases. Mijung Noh (2013) argued that the factor that users are most interested in, when using telemedicine services, is the possibility that their health could improve through the use of such services. Of course, there are still negative views on health management through telemedicine services, including drug delivery applications (Yeonseok Choi, 2020). However, it is undeniable that potential users expect the use of telemedicine services to be useful for their health management.

Regarding perceived ease of use, a study by Beldad&Hegrner (2018) and Cho et

al (2015) argued that the higher the perceived ease of use of a healthcare application, the higher the user's intention to use it. Kiyoung Noh et al (2014) argued that the intention to use telemedicine can be increased when elderly people with chronic diseases perceive that telemedicine can be easily used, and when telemedicine users feel that the service is useful.

Upon examining the preceding studies, it can be seen that the intention to use telemedicine services increases when users feel it is easy or useful to use the service. Therefore, in this study, the user's perceived ease of use and usefulness were predicted to have a significant effect on the intention to use untact drug delivery applications, and the following hypotheses were established.

Hypothesis 1. Perceived usefulness will have a positive (+) effect on intention to use untact drug delivery applications.

Hypothesis 2. perceived ease of use will have a positive (+) effect on intention to use untact drug delivery applications.

2.2.1 Trust

Trust plays a role in facilitating various social interactions among members of a society, and is defined as an essential condition for maintaining interpersonal relationships (JP Cannon&WD Perreault Jr, 1999). In addition, this study defines trust as the belief that users (patients) will choose to use telemedicine services. In the field of medical services, trust allows patients to feel safer when receiving medical services and treatments (D Mechanic& M Schlesinger - Jama, 1996), reduces psychological concerns of patients, and promotes word-of-mouth effects so that patients are disincentivized to change the medical institution or staff taking care of their well-being (LA Anderson&RF Dedrick, 1990).

Several studies have been reported to add trust as a sub-factor of the technology acceptance model, in order to explain users' intention to accept IT-based medical technology services (DH McKnight&NL Chervany, 2001; PA Pavlou, 2003). Additionally, trust has been regarded as an important determinant for users to accept telemedicine services (LA Anderson&RF Dedrick, 1990). In particular, in the context of a study examining user acceptance of telemedicine services, the importance of trust is further emphasized when participating in activities such as prescribing or purchasing medicine (T Ferguson - Bmj, 2000).

By examining the results of the preceding studies, it can be confirmed that trust acts as a catalyst between the medical staff as the telemedicine service provider, and the patient, as the user, and is an important factor that allows the user to continuously use the service. Therefore, in this study, by adding the element of ‘trust’ to the existing technology acceptance model, this study aims to investigate how the variable affects users’ intention to use untact drug delivery applications.

Hypothesis 3. Trust will have a positive (+) effect on intention to use untact drug delivery applications.

2.2.3 Stimulation Condition

Stimulation conditions are defined as the extent to which users believe that an organizational or technical basis is in place to support the use of new technologies (Venkatesh et al., 2012). These stimulation conditions were not included in the existing technology acceptance model.

The intention to use telemedicine services depends on the presence or absence of an appropriate technological infrastructure. In particular, in order to use a telemedicine service, one requirement is a connection between a medical worker and a user who are physically apart from each other. Providing medical services using an appropriate medical infrastructure and going through a feedback process is a prerequisite for promoting the adoption of telemedicine services among users (S Taylor&P Todd, 1995; Chiu, C. M et al., 2012).

According to Hanso et al (2020) a study was conducted on the factors that affect the use of mobile medical application on users of such applications. Based on the UTAUT2 model, which is an integrated theory related to the use and acceptance of information technology, factors affecting the behavior of mobile medical application use were analyzed, and it was confirmed that the facilitation conditions and habits have a positive effect on the user's intentions to use . In the study of Joonhyuk Koo and Kinam Jin (2021), a variable called environmental self-efficacy was presented, and they argued that it could be viewed as the same concept as that of the facilitation condition. Additionally, there are studies that show that environmental self-efficacy affects the intentions to directly and indirectly use telemedicine services (Chen & Chan, 2014; Rho, Kim et al, 2015; Cimperman, Brenčič& Trkman, 2016).

Summarizing the preceding studies above, it can be seen that the stimulation conditions have a positive effect on users' intention to use untact drug delivery applications. Therefore, in this study, the 'stimulation condition' was added as a variable to the existing rational behavior theory model, and based on this, the following hypothesis was established.

Hypothesis 4. Stimulation conditions will have a positive (+) effect on intention to use untact drug delivery applications.

2.2.4 Protection of Personal Information

Protection of personal information refers to the degree to which users believe that personal information provided for use of untact drug delivery apps will be managed safely (Junhyuk Koo and Kinam Jin, 2021). Moreover, due to the characteristics of telemedicine services, patients must provide their personal information to medical institutions such as hospitals and pharmacies in order to use the service.

With the recent medical information leaks from medical institutions becoming known to the public, patients are increasingly interested in whether their personal (medical) information is safely protected. Therefore, users who are sensitive to personal information leakage are highly likely to lower their intention to use untact

drug delivery services. This has been classified as one of the factors that influence intention to use through related prior studies (Shareef, M. A., Kumar, V., & Kumar, U., 2014; van Houwelingen, et al., 2018). Therefore, in this study, a variable of personal information protection was added to the existing rational behavior theory model, and based on this, the following hypothesis was.

Hypothesis 5. Privacy protection will have a positive (+) effect on the intention to use untact drug delivery applications.

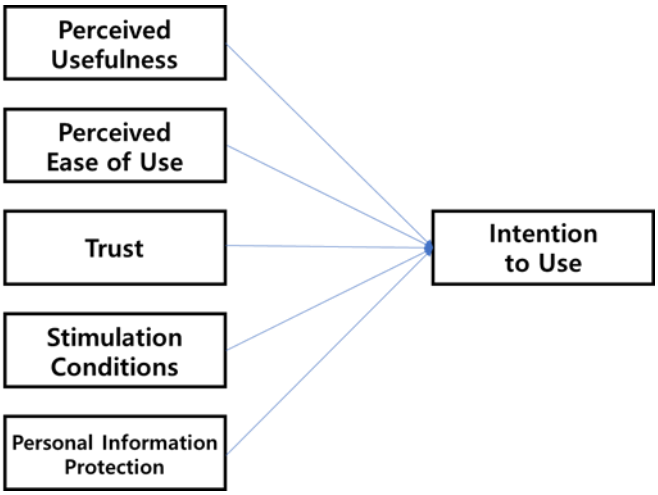

Fig. 1: Research Model

This research model was established based on previous studies. There were countless studies on each variable used in this study, and it was decided that it was necessary to verify them from a broader perspective. Thus, a model was constructed in an integrated form. Based on Fig. 1, we intend to investigate which factors can influence users' intentions to use untact drug delivery applications.

3. Research Design

3.1 Measurement Tools

The operational definitions and measurement questions of each variable constituting this research model were established as shown in Table 1, based on previous studies. First, three measurement variables (trust, stimulation conditions, and privacy protection) were added to the technology acceptance model based on previous research. Additionally, some of the questionnaire questions used in previous studies were modified and utilized in the form most suitable for this study.

For perceived usefulness, the study of Jinseok et al (2020). was used. Next, for the perceived ease of use, the study of Kiyoung Roh et al (2014), for trust, the study of MHM Javadi (2012), ., for the stimulation condition, the study of Sumin Kim and Changwon Lee et al (2013)., for personal information, the study of Youngim Bae,

Hyeri Shin (2020), and finally, for the intentions to use, the study of Junhyuk Koo and Kinam Jin (2021) were used.

Table 1 The Operational Definitions of the Study

Variable	Questionnaire	Relevant Previous Studies
Perceived Usefulness	1. Using a drug delivery app will make it easier for me to manage my health. 2. Using a drug delivery app will improve access to medical services. 3. Drug delivery apps will be useful in my daily life	Seok Jin(2020) Kijsanayotin et al..(2009) de Sena Abrahão&R., Moriguchi et al.(2016)
Perceived Ease of Use	1. Learning how to use a drug delivery application is not difficult. 2. Using a drug delivery app will make it easier for me to communicate with pharmacists. 3. Using a drug delivery app will be simple and easy to comprehend.	Kiyoung Roh et al.(2014) Angst, C. M., & Agarwal, R.(2009) Moores, T. T.(2012)
Trust	1. I can trust that through the drug delivery app, my health will improve. 2. There is no need to pay special attention when using a drug delivery app. 3. There is conviction that using the drug delivery app will provide benefits to me.	MHM Javadi, & HR Dolatabadi, M Nourbakhsh, & et al.,(2012)
Stimulation Conditions	1. Necessary elements (PC, smartphones,) for use of drug delivery app are prepared. 2. Am willing to learn how to use drug delivery app if necessary. 3. A drug delivery app would be relatively suitable for my healthcare routine.	Soomin Kim& Shangwon Lee(2013) M Riffai& K Grant, D Edgar(2012)
Personal Information Protection	1. I think the personal information held by medical institutions (hospitals, pharmacies,) are safely held. 2. Medical institutions will not leak or misuse my personal information.	Youngim Bae, Hyeri Shin (2020) Kim, H., Jhoo, J. H., & Jang, J. W.(2017) Faqih, Jaradat(2015)
Intention to Use	1. If provided the opportunity to use a drug deliver app, I would like to use it 2. I will use the drug delivery app in the future if necessary, when the drug delivery system is stabilized and more established. 3. If a drug delivery app is useful, I would consider recommending it to my acquaintances.	Joonhyuk Koo& Kinam Jin (2021) Egea, J. M. O., & González, M. V. R.(2011)

3.2 Demographic Characteristics & Sample Collection

To verify the study, the researcher distributed a questionnaire to those who experienced self-quarantine in Korea, upon their testing positive for COVID-19. In order to prevent the spread of infectious diseases, according to the government's quarantine measures, they were quarantined at their own homes and other places for a period of time, ranging from one week to a maximum of one month. During this period, they received medical treatment via phone or video calls with doctors, and experienced telemedicine services in direct or indirect forms, such as purchasing medicines using a drug delivery application. Therefore, it was determined that this would be the most suitable group for the verification of the study, and thus were selected as research subjects.

A questionnaire was randomly distributed to an online community of people who have been diagnosed with COVID-19. a total of 349 responses were collected, and excluding 11 questionnaires that could not be used as data due to dishonest responses, 338 copies were used as data for analysis. The questionnaire consisted of a Likert 7-point scale, and structural equation analysis was conducted through SPSS and AMOS programs as a tool for analysis. The demographic characteristics of the subjects who participated in this study are demonstrated in Table 2.

The data used in this study includes personal medical information. Therefore, prior to the survey, the participants were sufficiently familiar with the contents in advance. In addition, the data was destroyed immediately after the study was completed.

Table 2 Demographic Characteristics of Survey Subjects

Characteristics	**Category**	**Frequency (Number of People)**	**Proportion (%)**
Gender	Male	159	47.0
	Female	179	53.0
Age	Below 20	10	3.0
	20~29	146	43.2
	30~39	105	31.1
	40~49	50	14.8
	50~59	23	6.8
	60 or above	4	1.2
Average Monthly Income	None	8	2.4
	Below 1M krw	24	7.1
	1M ~2M krw	48	14.2
	2M~3M krw	88	26.0
	3M~4M krw	104	30.8
	4M~5M krw	34	10.1
	5M krw or above	32	9.5
Education	Elementary School Graduate or Below	0	0.0
	Middle School Graduate	6	1.8
	High School Graduate	60	17.8
	Community College Graduate	62	18.3
	College Graduate	172	50.9
	Postgraduate School Graduate	38	11.2
Average Number of Hospital Visits a Month	0	132	39.1
	1	135	39.9
	2	22	6.5
	3	16	4.7
	4	20	5.9
	Over 5	13	3.9
Distance Between Home and Hospital Most Visited	Within Walking Distance	142	42.0
	Within 10 Minutes by Car	42	12.4
	Within 30 Minutes by Car	22	6.5
	Within 1 Hour by Car	50	14.8
	Within 2 Hours by Car	44	13.0
	Within 3 Hours by Car	19	5.6
	Over 3 Hours by Car	19	5.6

4. Result of Empirical Analysis

4.1 Exploratory Factor & Reliability Analysis

Exploratory factor and reliability analyses were conducted to verify the validity and reliability of the measurement tools used in this study.

First of all, the KMO test and Bartlett's test of sphericity were performed to determine whether the collected data were suitable for exploratory factor analysis. The KMO test is a value indicating the degree to which the correlation between variables is explained by other variables, and a value of 0.5 or more is usually considered significant. Bartlett's test of sphericity is used to determine whether the model is suitable or not, based on probabilities, and the exploratory factor analysis model can be used only when the null hypothesis is rejected. Principal component analysis was conducted to extract the constituent factors, and the Verimax rotation method was used to simplify the factor loadings. The criteria for item selection in this study were 1.00 or higher for eigenvalue and 0.50 or higher for factor loading.

In order to confirm that the concept is appropriately measured, the reliability must be checked. Reliability refers to the probability that the same value will be obtained when the same concept is measured several times. When multiple items are used to measure the same concept, Cronbach's alpha coefficient was used as the internal consistency evaluation method for reliability. Cronbach's alpha coefficient is generally considered reliable at 0.70 or more. Reliability analysis was conducted for each factor.

Table 3 Exploratory factor analysis of measurement tools

Name of Measuring Tool	Question	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Stimulation Condition	Stimulation Condition 3	0.888	0.198	0.047	0.063	-0.019	0.018
	Stimulation Condition 1	0.871	0.315	0.090	0.115	0.039	0.075
	Stimulation Condition 2	0.812	0.296	0.013	0.045	0.029	0.062
Trust	Trust 3	0.209	0.853	0.052	0.065	0.008	0.109
	Trust 2	0.320	0.845	0.042	0.070	0.019	0.002
	Trust 1	0.288	0.806	0.081	0.130	0.074	0.100
Perceived Usefulness	Usefulness 1	0.070	0.039	0.869	0.100	0.162	0.110
	Usefulness 2	-0.028	0.077	0.822	0.210	0.151	0.062
	Usefulness 3	0.105	0.048	0.816	0.272	0.111	0.090
Intention to Use	Intention 2	0.096	0.154	0.135	0.854	0.085	0.081
	Intention 3	0.025	0.012	0.183	0.817	0.170	0.117
	Intention 1	0.112	0.113	0.324	0.787	0.228	0.099
Perceived Ease of Use	Ease 3	0.029	0.082	0.120	0.132	0.874	0.089
	Ease 2	-0.078	0.124	0.256	0.058	0.786	0.193
	Ease 1	0.079	-0.105	0.076	0.245	0.740	0.096

Protection of Personal Information	Personal Information Protection 2	0.061	0.093	0.120	0.147	0.138	0.909
	Personal Information Protection 1	0.069	0.088	0.112	0.104	0.195	0.907
Eigenvalue		5.405	3.114	1.552	1.227	1.190	1.041
Explained Variance (%)		31.79%	18.32%	9.13%	7.22%	7.00%	6.12%
Cumulative Explained Variance (%)		31.79%	50.11%	59.24%	66.46%	73.46%	79.58%
Reliability (Cronbach′s α)		0.891	0.868	0.851	0.850	0.782	0.883
KMO=0.792, Bartlett′s χ^2=3344.58 (df=136, p<.001)							

Table 3 shows the exploratory factor analysis results regarding the 17 items of measurement tools. These results were obtained by extracting items with an eigenvalue of 1.00 or more and a factor loading of 0.50 or more through exploratory factor analysis.

To begin with, KBO test and Bartlett's test of sphericity were conducted. The KMO value was 0.792, indicating that the selection of variables for exploratory factor analysis was appropriate. Moreover, as a result of the analysis conducted through Bartlett's test of sphericity, the significance probability was <.001, rejecting the null hypothesis. Therefore, the use of exploratory factor analysis is appropriate, and it is determined that there are common factors.

As for the result of the exploratory factor analysis of the measurement tool, six factors were extracted in the same way as in the original design of the study. The eigenvalues of the six extracted factors are all greater than 1.00, and the overall variance explanation power is 79.58%, which accounts for 79.58% of the six factors. Additionally, the Cronbach alpha coefficient of all six factors was 0.70 or higher, exceeding the standard value.

4.2 Degree of Measurement Tools of Research Subjects

Table 4 shows the average and standard deviation of the subjects' measurement tools through descriptive statistical analysis.

For statistics such as skewness and kurtosis, skewness was between -1.79 to -0.70, and kurtosis was -0.12 to 5.69. This satisfies the standard values of skewness of +-3 or less, kurtosis of +-8 or +-10, which are the standard values for normal distribution, and the main measurement tools demonstrate a normal distribution.

Table 4. Degree of Measurement Tools of Research Subjects

Measurement Tool	Min	Max	Mean	Standard Deviation	Skewness	Kurtosis
Perceived Usefulness	1.00	7.00	6.11	0.93	-1.28	1.47
Perceived Ease of Use	1.00	7.00	5.63	1.13	-0.70	-0.04
Trust	1.00	7.00	6.00	1.12	-1.79	4.07
Stimulation Condition	1.00	7.00	5.50	1.29	-1.00	0.93
Protection of Personal Information	1.00	7.00	5.31	1.54	-0.81	-0.12
Intention to Use	1.00	7.00	6.29	0.81	-1.76	5.69

4.3 Correlation Between Measurement Tools of Research Subjects

The Pearson correlation analysis was conducted to determine the correlation between measurement tools. The results are depicted in <Table 5>. The correlation between all measurement tools was found to have a significant positive (+) effect.

Table 5. Correlation between measurement tools of study subjects

Construct	1	2	3	4	5	6
1. Perceived Usefulness	1					
2. Perceived Ease of Use	0.388***	1				
3. Trust	0.174**	0.124*	1			
4. Stimulation Condition	0.149**	0.170**	0.578***	1		
5. Protection of Personal Information	0.281***	0.365***	0.215***	0.168**	1	
6. Intention to Use	0.488***	0.399***	0.244***	0.217***	0.310***	1

*p<.05, **p<.01, ***p<.001

4.4 Structural Equation Analysis

Confirmatory factor analysis was conducted to confirm whether the measured variables adequately explain each latent variable. The confirmatory factor analysis was conducted based on the results of the exploratory factor analysis, and the maximum likelihood method was used as the parameter estimation method.

The confirmatory factor analysis is the first step for structural equation analysis, which is used to confirm factor dimensions and hypotheses, and is a useful technique to verify the validity of scales for specific concepts. Moreover, based on confirmatory factor analysis, it is possible to organize observed variables that inhibit unidimensionality and violate plate validity. In addition, it also checks the reliability and validity.

The standardized factor loading was used to check the concentration (convergence) validity. In order to secure concentration (convergence) validity, the factor loading must be at least 0.5, and a value of 0.7 or more is appropriate. Moreover, the interpersonal relationship between the latent variable and the observed variable can be considered significant when the t-value (C.R, threshold) is 1.96 or more at the

significance level of 0.05 or if the t-value is 2.57 or more at the significance level of 0.01.

Secondly, construct reliability (CR) and average variance extracted (AVE) were checked. If the construct reliability (CR) is usually 0.7 or more and the average variance extracted (AVE) is at a value of 0.5 or more, it can be considered as having concentration (convergence) validity.

Thirdly, discriminant validity means 'the degree to which one construct is differentiated from other constructs', and the evaluation method is to compare the value of the average variance extracted (AVE) of the constructs and the square value of the correlation coefficient (R^2) of the constructs. As a method, it can be said that discriminant validity is secured when the value of the average variance extracted (AVE) is large.

Table 6. Concentration (Convergence) Validity Analysis of Measurement Tools

Measurement Tool	Question	Standardized Factor Payload	Standard Error	Measured Error	t-value	AVE[1)]	CR[2)]
Perceived Usefulness	Usefulness 1	0.820		0.328			
	Usefulness 2	0.782	0.049	0.389	16.075	0.658	0.853
	Usefulness 3	0.832	0.048	0.308	17.497		
Perceived Ease of Use	Ease 1	0.616		0.620			
	Ease 2	0.796	0.051	0.367	15.651	0.574	0.799
	Ease 3	0.842	0.050	0.290	16.775		
Trust	Trust 1	0.823		0.322			
	Trust 2	0.861	0.046	0.259	18.720	0.691	0.870
	Trust 3	0.809	0.047	0.346	17.122		
Stimulation Condition	Stimulation Condition 1	0.968		0.063			
	Stimulation Condition 2	0.757	0.047	0.427	16.008	0.743	0.895
	Stimulation Condition 3	0.847	0.045	0.282	18.791		
Protection of Personal Information	Personal Information Protection 1	0.896		0.197		0.791	0.883
	Personal Information Protection 2	0.883	0.055	0.221	16.106		
Intention to Use	Intention 1	0.911		0.169			
	Intention 2	0.772	0.048	0.405	15.911	0.657	0.850
	Intention 3	0.737	0.049	0.456	14.986		
Acceptance Criteria		>0.5			>1.96	>0.5	>0.7

1) AVE: Average Variance Extracted

2) CR: Construct Reliability

Table 6 depicts the results of the concentration (convergence) validity analysis of the measurement tool. As a result of examining the results of the concentration (convergence) validity analysis, all factor loadings were over 0.5, indicating that the concentration (convergence) validity was secured. All of the measured variables had t-values of 1.96 or above, so they were significant at the significance level of $p<0.05$, indicating that all measured variables appropriately measured the corresponding latent variables. Construct reliability (CR) and the value of average variance extracted value (AVE) were all found to have secured concentration (convergence) validity above the standard values as shown in Table 6.

The results of the discriminant validity analysis of the measurement tools are shown in <Table 7>. As demonstrated below, it can be said that discriminant validity is secured because the diagonal element value, which is the value of the average variance extracted (AVE) of the sub-concepts, is greater than the square value (R^2) of the correlation coefficient between the sub-concepts.

Table 7. Discriminant Validity Analysis of Measurement Tools

Measurement Tools	1	2	3	4	5	6
1. Perceived Usefulness	0.658*					
2. Perceived Ease of Use	0.150	0.574*				
3. Trust	0.030	0.015	0.691*			
4. Stimulation Conditions	0.022	0.005	0.334	0.743*		
5. Protection of Personal Information	0.079	0.133	0.046	0.028	0.791*	
6. Intention to Use	0.238	0.159	0.059	0.047	0.096	0.657*
Acceptance Criteria	Average Vraiance Extracted (AVE) > Squared Value of Correlation Coefficient between Constructs (R^2)					

*=AVE

Table 8 demonstrates the suitability result of confirmation factor Analysis model for measurement tools. By checking the fitness index, as shown in Table 8, χ^2=294.835 (<.001) was not significant at the significance level of 5%, so the structural model was not suitable for the collected data. However, the chi-square test has a drawback in that it is sensitive to the sample size. Thus, it would be desirable to consider other fitness indices as well. The standardized chi-square (χ^2/df) was 2.835 smaller than 3.00, RMR was 0.043 smaller than 0.08, and RMSEA was 0.074 smaller than 0.10. GFI was 0.907, NNFI was 0.945, NFI was 0.939, CFI was 0.958, IFI was 0.959, and RFI was 0.920, which was higher than 0.90. In other words, it can be determined that the model is relatively suitable when it is comprehensively compared.

Table 8. Suitability Result of Confirmation Factor Analysis Model for Measurement Tools

	Fit Value	Standard Fit Value	Suitability
χ^2(p value)	294.835 (<.001)	p>0.05	Not Suitable
df	104		
χ^2/df	2.835	Below 3.00	Suitable
RMR	0.043	Below 0.05 : Good Below 0.05~0.08: Decent	Suitable
RMSEA	0.074	Below 0.05: Good Below 0.08: Adequate Below 0.10 이하 : Standard	Suitable
GFI	0.907	Over 0.90	Suitable
NNFI	0.945	Over 0.90	Suitable
NFI	0.939	Over 0.90	Suitable
CFI	0.958	Over 0.90	Suitable
IFI	0.959	Over 0.90	Suitable
RFI	0.920	Over 0.90	Suitable

To test the hypothesis, a model was established as shown in Figure 2. As a result of the analysis, 2 pathways out of 5 were found to be significant.

Table 9 demonstrates the fit of the hypothesis test model. By checking the fit index, as depicted in Table 9, χ^2=294.835 (<.001) was not significant at the significance level of 5%, so the structural model was not suitable for the collected data. However, the chi-square test has a disadvantage of being sensitive to the sample size, and it would be ideal to consider other fitness indices at the same time.

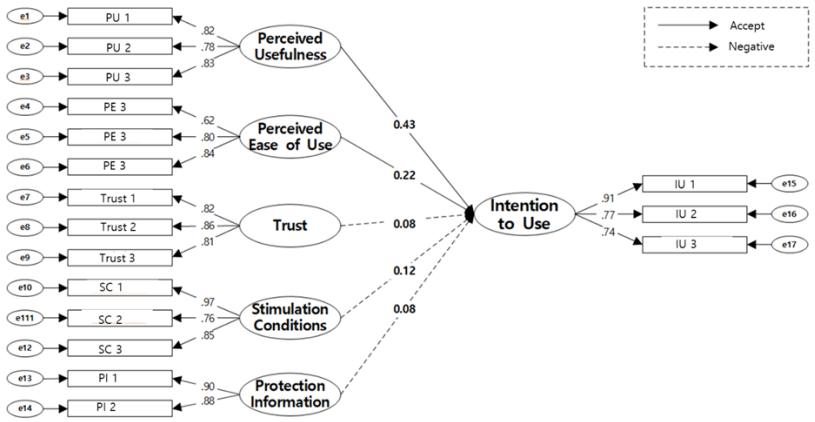

Fig. 2: hypothesis test model

The standardized chi-square value (χ^2/df) was 2.835, smaller than 3.00, RMR was 0.043, smaller than 0.08, and RMSEA was 0.074, smaller than 0.10. GFI was 0.907, NNFI was 0.945, NFI was 0.939, CFI was 0.958, IFI was 0.959, and RFI was 0.920, which was higher than 0.90. In other words, it can be said that the model is relatively suitable when it is comprehensively compared.

Table 9. Suitability Result of Structural Model

	Fit Value	**Standard Fit Value**	**Suitability**
χ^2(p value)	294.835 (<.001)	p>0.05	Not Suitable
df	104		
χ^2/df	2.835	Below 3.00	Suitable
RMR	0.043	Below 0.05: Good Below 0.05~0.08: Decent	Suitable
RMSEA	0.074	Below 0.05: Good Below 0.08: Decent Below 0.10: Standard	Suitable
GFI	0.907	Over 0.90	Suitable
NNFI	0.945	Over 0.90	Suitable
NFI	0.939	Over 0.90	Suitable
CFI	0.958	Over 0.90	Suitable
IFI	0.959	Over 0.90	Suitable
RFI	0.920	Over 0.90	Suitable

The results of the five hypotheses tested for the direct effect presented in this study are shown in <Table 10>. Hypothesis 3 (trust → intention to use), hypothesis 4 (stimulation conditions → intention to use), and hypothesis 5 (protection of personal information → intention to use) were rejected, and the remaining two hypotheses were adopted.

Table 10. Result of Direct Effect Hypothesis Test

Path (Hypothesis)	Path Coefficient	Standard Error	t-value	Accept
H1) Perceived Usefulness → Intention to Use	0.433	0.062	6.954***	○
H2) Perceived Ease of Use → Intention to Use	0.217	0.064	3.373***	○
H3) Trust → Intention to Use	0.076	0.071	1.073	×
H4) Stimulation Conditions → Intention to Use	0.116	0.068	1.713	×
H5) Protection of Personal Infomration → Intention to Use	0.080	0.058	1.369	×

*p<.05, **p<.01, ***p<.001

Hypothesis 1. Perceived usefulness will have a positive (+) effect on intention to use. (Selected)

When examining the path coefficients of perceived usefulness and intention to use, to test the hypothesis, the higher the perceived usefulness, the higher the intention to use (path coefficient = 0.433, SE = 0.062, t = 6.954), so the hypothesis was proven.

Hypothesis 2. Perceived ease of use will have a positive (+) effect on intention to use. (Selected)

When examining the path coefficients of perceived ease of use and intention to use, to test the hypothesis, it was discovered that the higher the perceived ease of use, the higher the intention to use (path coefficient = 0.217, E = 0.064, t = 3.375), so the hypothesis was proven.

Hypothesis 3. Trust will have a positive (+) effect on intention to use. (Rejected)

When examining the path coefficients of trust and intention to use, to test the hypothesis, it was not proven that the higher the trust, the higher the intention to use (path coefficient = 0.076, SE = 0.071, t = 1.073).

Hypothesis 4. Stimulation conditions will have a positive (+) effect on intention to use. (Rejected)

When examining the path coefficients of the stimulation condition and intention to use, to test the hypothesis, it was not proven that the higher the facilitation condition, the higher the intention to use (path coefficient = 0.116, SE = 0.068, t = 1.713).

Hypothesis 5. Privacy protection will have a positive (+) effect on the intention to use. (Rejected)

Looking at the path coefficients of personal information protection and intention to use to test the hypothesis, it was not proven that the higher the personal information protection, the higher the intention to use (path coefficient = 0.080, SE = 0.058, t = 1.369).

5. Conclusion

5.1 Research Summary & Results

The purpose of this study is to determine which variables affect the decision process to use non-face-to-face drug delivery. In addition, it aims to contribute to legalization and institutional stabilization in the future by highlighting the intention of consumers to use non-face-to-face drug delivery applications. This study explores an expanded technology acceptance model including trust, stimulation conditions, and protection of personal information in the existing technology acceptance model, and examines the intention and decision process for using untact drug delivery applications for those who have self-quarantined upon testing positive for COVID-19. Specifically, the effects of the above-mentioned variables on users' intentions to use, along with perceived usefulness and perceived ease of use, which are one of the variables of the technology acceptance model, were studied. This research on the decision-making process of untact drug delivery applications will be applied not only to drug delivery but also to the telemedicine industry in the future, which will be of great help in revising the legal aspect of the medical system and establishing marketing strategies. The analysis results of this study are presented as follows:

To begin with, most of the survey participants positively responded to questions about the intention to use the untact drug delivery applications (average value: 6.29 points). It can be determined that if all conditions are met in the future, there will be a general increase in the use of not only drug delivery applications but telemedicine services overall.

Secondly, in explaining the intention to use the drug delivery application, the perceived usefulness and perceived ease of use, which are the existing variables of the technology acceptance model, were found to have a significant positive (+) effect on the intention to use. This demonstrates the results of previous studies that analyzed the acceptance intention of telemedicine technology through the technology acceptance model. However, the remaining three variables (trust, stimulation conditions, and protection of personal information) did not appear to have a significant effect on user intention to use, contrary to the hypothesis initially established in the research. The researcher analyzed the results as follows: First, trust is defined as the belief that users (patients) will choose telemedicine services. Currently, in Korea, untact drug delivery applications are just now being introduced, so there is a lack of user reviews and objective evaluation data from relevant organizations for users to refer to. Additionally, side effects of telemedicine are frequently exposed to users through the media. Therefore, it is expected that such news will have a negative effect on users' trust in telemedicine, and as a result, it is determined that this may have contributed to the rejection of the hypothesis. Several previous studies that researched online reviews (Hsu and Lin, 2015, et al), support this claim by determining that user reviews and their recommendations have a significant influence in decision-making when it comes to mobile applications. Next,

the stimulation condition is defined as the degree to which the user believes that an organizational or technical basis is in place to support the use of new technology (Venkatesh et al., 2012). Currently, in Korea, the legalization of telemedicine is underdeveloped, so the necessary conditions for stimulation are not properly met. Therefore, it can be said that the stimulation conditions did not significantly affect the intention to use the drug delivery application. Accordingly, for the expansion of the telemedicine industry, a legal foundation should be prepared as soon as possible. Moreover, it was reported that the stimulation conditions did not significantly affect the intention to use u-Healthcare, in a study by Sunghee Jang et al. (2011). Next, looking at personal information protection, as mentioned above, domestic patients react very sensitively to the leakage of their medical information, and in the event of such accident, the probability of not using the drug delivery application increases. However, so far, there are not any reported cases of such accidents taking place in Korea, so it is expected that such external factors negatively affect the user's intention to use personal information.

Lastly, looking at the demographic results, it is expected that the main users of untact drug delivery applications in the future will be young adults led by the MZ generation, and at the same time, they show above-average educational and income levels. Additionally, a significant number of people regularly visit medical institutions for underlying diseases and take (use) medicines. There were also many cases in which the medical institutions they mainly visit were located far away from their residence. Accordingly, industry representatives, providing pharmaceutical delivery services, will have to provide services tailored to each patient considering these user characteristics.

5.2 Implications of the Research

In the current situation where the introduction of telemedicine is on the rise, due to the spread of COVID-19, this study has great significance in that it identifies the acceptance intentions and influencing factors of potential users, and it also contributes to the development of prior theories. Based on the research results, the following implications are suggested:

Firstly, the researcher urges the legalization of untact drug delivery service through the overall revision of medical laws, and the deregulation of the telemedicine industry as a whole. As a concrete improvement plan, first, the medical law should be amended so that telemedicine, which is currently implemented in the form of consultation between medical personnel, can be expanded to telemedicine between doctors and patients. Secondly, for the practice of telemedicine, the allowable range should be stipulated based on professionalism and risk, and detailed guidelines such as selection of medical subjects. Third, to ensure the safety of telemedicine services, it will be necessary to prepare various safety devices such as certification systems at the government-level, and telemedicine selection systems. Finally, in the case of untact drug delivery based on telemedicine, it is necessary to clarify the person responsible

for the entire supply chain. For example, when a drug leaves the hands of the pharmacist, and problems of loss, misdelivery, or swindling of narcotic drugs occur during the delivery process, the user will inevitably bear the damage. Therefore, if a government-led committee is formed to improve in the system in the future, not only should medical workers be appointed, but logistics experts should also be appointed as advisors to prevent side effects that may occur during the physical distribution process.

Of course, as some medical groups with certain interests claim, the safety of telemedicine has not been guaranteed yet, and various side effects may occur. However, that telemedicine is the ultimate goal of guaranteeing the people's right to health should not be overlooked, and through this, providing high-quality medical services and convenience to the medically vulnerable class is possible. Furthermore, the institutionalization of telemedicine can contribute to solving problems of future generations such as depletion of medical insurance reserves. Moreover, it will be able to grow the medical industry pie as a whole, create jobs, and provide new opportunities for the future, where we expect a change in the policy paradigm led by the new government so that synergies can be created throughout the industry as a whole by fully opening the telemedicine market.

Secondly, in the case of telemedicine service industry officials, led by untact drug delivery applications, if we can provide an optimized service based on a detailed analysis of factors affecting user intentions, telemedicine in Korea, which is currently in a transitional state, could gain a strong competitive advantage.

Lastly, and hopefully, this study becomes the starting point of research for untact drug delivery applications in Korea, which is currently not well-known.

5.3 Limitations of the Research

This study has the following limitations.

First, there is a possibility that the research results may be distorted because both the recruitment of subjects and distribution of the questionnaire were conducted online. Although this study conducted an online survey of people who were placed in quarantine upon their testing positive for COVID-19, by examining the demographic characteristics, there were not many samples collected from the elderly, who did not have easy access to IT. Also, the online survey it self is highly likely to have drawn a large number of new technology-friendly samples.

Secondly, the intention to use the telemedicine service based on IT may appear differently depending on the characteristics of the user's experience. For example, if potential users are highly innovative, as in the case of early adopters, there is a high probability that the intention to use the service will be high. Therefore, in future research, it is necessary to prepare an appropriate device to control this.

Finally, this study could not prove that the three variables, (trust, stimulation conditions, and protection of personal information) added as measurement items of user intention to use, had a significant relationship with the intention to use. As

depicted above, the researcher overlooked results of previous studies, which went against the hypotheses established in this study. Additionally, the selection of subjects for the study was unsatisfactory, and there was an absence of control devices to control external factors that affected the research results, potentially leading to distortions in the study's result. Accordingly, in subsequent studies, the researcher will have to review previous studies that contradict this research model, from a broader perspective. Furthermore, it will be necessary to select an appropriate survey target and prepare appropriate devices to control external factors of influence.

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