ISSN 1846-6168 (Print), ISSN 1848-5588 (Online)
https://doi.org/10.31803/tg-20230224142711

Original scientific paper
Received: 2023-02-24, Accepted: 2023-04-06

A Study on the Effect of Quality Factors of Smartphone 5G Technology on the Reliability of Information and Communication Policy

Chil-Yuob Choo

Abstract: This paper analyzes the effect of the characteristics of 5G services on users' continuous intention to use, focusing on the technology acceptance model. With the start of the fourth industrial revolution in the 21st century, 5G is the best technology used in the Internet of Things, high-speed information and communication, artificial intelligence, big data, autonomous vehicles, virtual reality, augmented reality, robots, nanotechnology, and blockchain. The technical characteristics of 5G ultra-high-speed information communication are represented by ultra-high speed, ultra-high capacity, ultra-low delay, and ultra-high connectivity. 5G mobile communication technology is essential, and after the technology provided by 5G services is commercialized, it can play all its roles as a practical core new growth engine. 5G mobile communication (hereinafter referred to as 5G) is far superior to LTE, which is a 4G mobile communication, in terms of transmission speed, waiting time, and terminal capacity. 5G service is not just an axis of the process of developing mobile communication technology, but also the creation of innovative corporate value of technology. This is because higher network quality and innovation with 5G service technology will improve perceived usability, perceived ease of use, and perceived entertainment, which will ultimately have a positive impact on users' intention to use 5G services. Therefore, due to the lack of investment in information and communication bases, platforms, and applications, this paper can be used as the basis for establishing government policies.

Keywords: 5G; AI; big-data; ICT; IOT; smart phone quality

1 INTRODUCTION

This study examines the service quality factors of 5G smartphones, one of the 4th revolution projects that have recently become an issue, closely analyzes the effects of these quality factors on user satisfaction from the perspective of the technology acceptance expansion model, and identifies how user satisfaction affects government policy.

The effect of 5G service quality factors on perceived usability, perceived ease of use, and user satisfaction based on the technology acceptance model, and how this use satisfaction affects the trust of government policies are constructed by the technology acceptance research expansion model.

Modern information society is the 4th revolutionary industry, and hope for information transmission and utilization of economic value and future is growing as information transmission is rapidly transmitted anywhere and anywhere through high-speed, hyper-connected, and big data. In Korea, the world's first ceremony to declare the use of 5G was held in 2019, and the vision for the fourth revolutionary industry is gradually being promoted day by day. By early 2020, it is predicted that the era of 100 years of Smart Convergence Hundred, in which the era of 5G smart information that can lead the world, becomes common. By 2020, the government has designated 10 industries such as 5G smartphones, robots, and drones as 5G+ (plus) strategic industries, and the Ministry of Science and ICT has selected 5 service projects and 10 industries as strategic industries. This study should study the government's credibility in infrastructure and platform for high-speed information delivery industry, and establish support and supplement system for Korea to become a leader in global 4th revolutionary industry and improve people's lives and quality.

As the scope of the information system, such as the establishment of a customer relationship management (CRM) system for customer-centered management, gradually expands and various complexity increases, information data quality becomes the most important factor. Therefore, this study focuses on the information quality, service quality, and system quality of public data for the 4th revolution project, and reveals the relationship between the government's reliability and policy trust.

2 RELATED WORKS

2.1 Theoretical Background

The technology acceptance expansion model was introduced by Davis [1] by modifying Davis presented a technology acceptance expansion model as a basis using the variables perceived usefulness and perceived convenience as the main related variables of computer acceptance behavior. The perceived usefulness and perceived convenience variables can be said to be the core of the technology acceptance expansion model (TAM). Analyzing the definitions of these two variables, perceived usefulness refers to the difference in the degree to which individuals believe that working with a particular information system can improve work performance, and perceived convenience refers to the degree to which they believe working with it will be a little less [1]. The technology acceptance the rational behavior theory, and the purpose of the introduction was to model the user acceptance of the information system. The technology acceptance expansion model provides a sufficient explanation of the determinants of computer acceptance and is characterized by a wide range of end-user computing technologies and comprehensive enough to explain user behavior across the user population. The core purpose of the technology acceptance expansion model is a technology that provides a basis for tracking the integrated impact of external

factors on inner beliefs, attitudes, and intentions. In order to achieve these goals, the technology acceptance expansion model fully identified a small number of basic variables presented by continuous previous studies dealing with the determinants of computer acceptance and used rational behavior theory as a theoretical background to model them based on their theoretical relevance expansion model proposed by Davis [2] is shown.

2.2 Exploration of the Previous Research Model

In the field of information systems such as [5], models for expanding technology acceptance are being expanded and applied in various forms. As external variables suitable for mobile media, information system quality, social impact, self-efficacy, driving conditions, and trust were presented, and the causal relationship with mobile banking was verified from the overall perspective of TAM, trust, and influence variables. In addition, in a study on the success factors of the mobile video UCC service, the promotion of personal characteristics, system characteristics, and content characterization was expanded by expanding mobile content characteristics to analyze users' learning about e-learning. Empirical analysis of non-users and users of smartphone applications in the technology acceptance expansion model shows that they are willing to use the application in terms of perceived enjoyment and usefulness, such as repeated verification of the technology acceptance expansion model and adding external or belief variables. Although there are various studies on the extended technology acceptance model, website information quality has a significant effect on perceived pleasure, perceived usefulness, perceived ease of use, especially accuracy, clarity, sufficiency, and reliability among website information quality characteristics. The trend of research on the recently expanded technology acceptance expansion model is to supplement the explanatory power of information technology delivery technology by integrating the core variables, perceived ease, and perceived usefulness of the technology acceptance expansion model [6]. In order to explore previous studies related to 5G information technology, which is the main focus of this study, the study on the extended technology acceptance model centered on the Internet and mobile was examined. And Kim Soo-Hyun [7] expanded the effect of IPTV service on adoption intention.

2.3 Rational Theory of Behavior (TRA)

The theory of reasoned action (TRA) model is an extended model widely studied in social psychology, in which individual behavior is determined by behavioral intention, and behavioral intention is determined by individual attitude and subjective norm [3]. Behavioral intention is estimated to contain motivational factors that affect actual behavior. Attitude to behavior refers to expectations related to behavioral evaluation, and evaluation refers to evaluations related to desirable performance achievement, which are expressed as beliefs along with subjective norms. In addition, subjective norms are defined as perceived social pressures associated with performing actions. Normative beliefs also refer to beliefs related to meaningful behavioral expectations. Motivation for consent means motivation for pursuing consent of the subject of reference. However, there is a limitation that this expansion model has no choice but to apply only to actions within the scope of voluntary control. There must be a problem when applying information to areas such as the use of involuntary information technology that require the skill to access and utilize computer systems [4].

2.4 Planned Behavior Theory (TPB)

The theory of planned behavior (TPB) model is an extended theoretical model that adds the concept of a user's perceived behavioral control to the rational behavioral theory (TRA) model. This is a theoretical model for dealing with the behavior of people with incomplete voluntary control, and its scope of application is wider than the rational behavioral theory model. Perceived behavioral control can be seen as related to people's perception of the degree of ease (excessive resources, opportunities, proficiency, etc.) in performing actions. In other words, it is based on the assumption that the performance of behavior depends on both ability (behavior control) and motivation (behavior intention). Control beliefs can be said to be the degree to which an individual can control the resources, opportunities, and proficiency to perform an action. Perceived facilitation is a concept related to whether or not to promote control beliefs to prevent or promote action. However, empirical analysis of this series of mutual causality and interdependence between preceding variables is still insufficient [4].

3 RESEARCH AND DESIGN

Based on previous studies on the expanded technology acceptance model, a research model was established as shown in Fig. 1. Since the commercialization of smartphones using 5G information technology is not satisfactory yet, the results derived when applying 5G information technology to the smartphone quality sector based on existing data quality factors will be very significant.

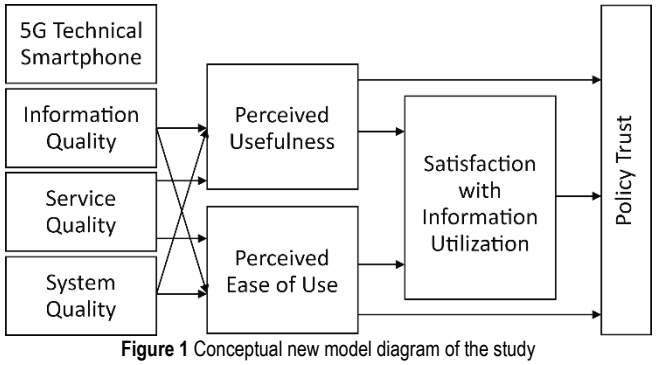

Figure 1 Conceptual new model diagram of the study

Information quality, service quality, and system quality were set based on the research of Lee Seong-Taek [8] as smartphone quality factors to which 5G information

technology was applied. To see how these factors finally affect government policy trust related to 5G information technology, perceived usefulness and perceived ease were introduced as parameters, and information utilization satisfaction was selected as parameters in the relationship between perceived usefulness and perceived ease of government policy trust.

For the design of this study, a survey was conducted on 310 people. As a result, there were 157 men (50.6%) and 153 women (49.4%), and 78 people (25.2%) in their 20s, 76 (24.5%) in their 30s, 76 (24.5%) in their 40s, and 80 (25.8%) in their 50s. There were 37 (11.9%) graduates from high school or below, 230 (74.2%) graduates from junior college or university, 43 (13.9%) graduates from graduate school or above, 6 (1.9%) public servants, 39 (12.6%) professionals, 161 (51.9%) office workers, 45 (14.5%) students, and 59 others (19.0%). There were 238 people (76.8%) in "yes" and 72 people (23.2%) in "no", and 92 people (29.7%) in "yes" and 218 (70.3%) in "no" in terms of 5G technology usage experience. The advantages of applying 5G technology to government public services were 78 (25.2%), 71 (22.9%) for disaster response and public safety services, 123 (39.7%) for big data-based intelligent services, 37 (11.9%) for VR and AR services, and 1 (0.3%).

As mentioned above, Jeong Man-Soo [9] while studying the intention to use 5G mobile communication services applied Amos 21 Structural Equation Modeling [10]. We constructed a new model by referring to a research model based on an extended technology acceptance model. It verifies the effect of belief variables on intention to use based on the research model.

Exploratory factor analysis was conducted to verify the validity of the measurement tool used in this study. Among the factor analysis methods, principal component analysis was used to minimize information loss while extracting factors explaining as much of the variance of the original variables as possible, and Varimax rotation was used to rotate the factor until the factor structure was most obvious.

As for the smartphone quality factors to which 5G technology is applied, one item (information quality number 4) that hinders validity was excluded, and the factor analysis was finally conducted with 11 items. As a result of the analysis, the *KMO* measure is. It was found to be 910, and Bartlett's sphericity test results were also significant ($p < 0.001$), the factor analysis model was judged to be suitable.

Factor classification was classified as a factor when factor loading exceeded 0.50, and smartphone quality factors applied with 5G technology were classified into three factors, and the three factors showed 64.743% factor explanatory power. The first factor was composed of three items, 'information quality', the second factor was four items, and the third factor was four items, 'system quality'.

In addition, the Cronbach's α coefficient was 0.783, the service quality was 0.785, and the system quality was 0.779. As a result, since all measurement tools showed a reliability index of 0.70 or higher, the reliability of the measurement tools was judged to be good.

The perceived usefulness and perceived ease of use were excluded from two items that hinder validity (recognized ease of use No. 1 and No. 2) and finally, a factor analysis was conducted with 12 items. As a result of the analysis, the *KMO* measure is. It was found to be 899, and Bartlett's sphericity test results were also significant ($p < 0.001$), the factor analysis model was judged to be suitable.

Table 1 Results of factor analysis of smartphone quality factors using 5G technology

Category	Main Cause		
	1	2	3
Information Quality 2	0.767	0.208	0.244
Information Quality 1	0.757	0.327	0.206
Information Quality 3	0.729	0.210	0.220
Service Quality 3	0.109	0.814	0.129
Service Quality 4	0.189	0.756	0.119
Service Quality 2	0.372	0.659	0.207
Service Quality 1	0.442	0.575	0.246
System Quality 1	0.128	0.080	0.796
System Quality 3	0.150	0.351	0.740
System Quality 2	0.474	0.061	0.663
System Quality 4	0.396	0.233	0.584
An Eigenvalue (Eigen value)	2.495	2.380	2.247
Co-Dispersion (%)	22.678	21.639	20.426
Cumulation Variance (%)	22.678	44.317	64.743
Cronbach's α	0.783	0.785	0.779
KMO = 0.910 Bartlett χ^2 = 1333.793 ($p < 0.001$)			

Factor classification was classified as a factor when factor loading exceeded 0.50, perceived usefulness and perceived ease of use were classified as two factors, and the two factors showed 58.173% factor explanatory power. The first factor consisted of seven items, 'cognitive ease', and the second factor consisted of five items, 'cognitive usefulness'.

In addition, the perceived usefulness of the Cronbach's α coefficient was 0.789, and the perceived ease was 0.878. As a result, since all measurement tools showed a reliability index of 0.70 or higher, the reliability of the measurement tools was judged to be good.

Information utilization satisfaction and policy trust were analyzed in nine items. As a result of the analysis, the *KMO* measure was 0.821, and Bartlett's sphericity verification result was also significant ($p < 0.001$), the factor analysis model was judged to be suitable.

The factor classification was classified as a factor when the factor loading exceeded 0.50, and information utilization satisfaction and policy trust were classified into two factors, and the two factors showed a factor explanatory power of 58.572. The first factor was composed of four items, 'policy trust', and the second factor was five items, 'information utilization satisfaction'.

In addition, the Cronbach's α coefficient was 0.756 for satisfaction with information use and 0.827. As a result, since all measurement tools showed a reliability index of 0.70 or higher, the reliability of the measurement tools was judged to be good.

The statistical analysis method conducted for this study is summarized as follows. First, frequency analysis was conducted to understand the demographic characteristics of the study subject.

Second, an exploratory factor analysis was conducted to analyze the validity of the measurement tool, and the

reliability of the items constituting the factor was analyzed using the Cronbach's alpha coefficient.

Third, descriptive statistical analysis was conducted to understand the level of major variables, and skewness and kurtosis were calculated to determine whether the normality assumption was satisfied. Fourth, Pearson's correlation analysis was conducted to understand the correlation between major variables. Fifth, an independent sample t-test and one-way variance analysis were conducted to verify the difference between major variables according to the demographic characteristics of the study subject. Sixth, structural equation modeling was analyzed to verify the research model. Seventh, bootstrap analysis was conducted using phantom variables to verify the indirect effect between variables. IBM SPSS 22.0 and AMOS 22.0 were used for statistical analysis, and statistical significance was determined based on the significance level of 5%.

4 RESEARCH RESULTS

4.1 Feasibility and Reliability Analysis of Measurement Tools

Smartphone quality factors using 5G technology Exploratory factor analysis was conducted to verify the validity of the measurement tool used in this study. Principle component analysis was used to minimize information loss while extracting factors that explain as much of the variance of the original variables as possible, and Varimax rotation was used to rotate factors until the factor structure was most pronounced while maintaining factor independence.

As for the smartphone quality factor to which 5G technology was applied, one item (information quality No. 4) that hinders validity was excluded, and factor analysis was finally conducted with 11 items. As a result of the analysis, the *KMO* measurement is. It was shown as 910, and Bartlett's sphericity verification results were also significant ($p < 0.001$), the factor analysis model was judged to be suitable.

Factor classification was classified as a corresponding factor if the factor loading exceeds .50, and smartphone quality factors using 5G technology were classified into three factors, and the three factors showed 64.743%. The first factor consisted of 'information quality' with three items, the second factor consisted of 'service quality' with four items, and the third factor consisted of 'system quality' with four items.

In addition, the Cronbach's coefficient was 0.783 for information quality, 0.785 for service quality, and 0.779 for system quality. As a result, the reliability of the measurement tool was judged to be good because all measurement tools showed a reliability index of 0.70 or more.

4.2 Perceived Usefulness and Perceived Ease

For perceived usefulness and perceived ease, factor analysis was finally conducted with 12 items, excluding two items (recognized ease No. 1 and No. 2) that hinder validity. As a result of the analysis, the *KMO* measurement is. It was 899, and Bartlett's sphericity verification results were also significant ($p < 0.001$), the factor analysis model was judged to be suitable.

The factor classification was classified as a corresponding factor if the factor loading exceeded 0.50, and perceived usefulness and perceived ease were classified into two factors, and the two factors showed 58.173% factor explanatory power. The first factor was composed of 7 items, 'perceived ease', and the second factor was composed of 5 items, 'perceived usefulness'.

In addition, the perceived usefulness of Cronbach's coefficient was 0.789, and the perceived ease was 0.878. As a result, the reliability of the measurement tool was judged to be good because all measurement tools showed a reliability index of 0.70 or more.

Table 2 Results of factor analysis of perceived usefulness and perceived ease of use

Category	Main Cause	
	1	3
Perceived Ease 9	0.866	0.075
Perceived Ease 8	0.816	0.205
Perceived Ease 7	0.719	0.328
Perceived Ease 3	0.703	0.067
Perceived Ease 5	0.652	0.346
Perceived Ease 6	0.642	0.399
Perceived Ease 4	0.558	0.423
Perceived Usefulness 2	0.028	0.805
Perceived Usefulness 4	0.217	0.786
Perceived Usefulness 1	0.204	0.770
Perceived Usefulness 3	0.286	0.577
Perceived Usefulness 5	0.383	0.528
An Eigenvalue (Eigen value)	3.894	3.087
Co-Dispersion (%)	32.451	25.722
Cumulation Variance (%)	32.451	58.173
Cronbach's α	.878	.789
KMO = 0.899 Bartlett χ^2 = 1663.229 ($p < 0.001$)		

4.3 Satisfaction with Information Utilization and Policy Trust

Factor analysis was conducted with nine items for information utilization satisfaction and policy trust. As a result of the analysis, the *KMO* measure was 0.821, and Bartlett's sphericity verification result was also significant ($p < 0.001$), the factor analysis model was judged to be suitable.

Table 3 Results of factors analysis of satisfaction with information utilization and policy trust

Category	Main Cause	
	1	2
Policy Trust 1	0.816	0.065
Policy Trust 2	0.804	0.146
Policy Trust 4	0.786	0.175
Policy Trust 3	0.770	0.195
Satisfaction With Information Utilization 2	0.082	0.784
Satisfaction With Information Utilization 3	0.069	0.746
Satisfaction With Information Utilization 1	0.233	0.689
Satisfaction With Information Utilization 4	0.379	0.618
Satisfaction With Information Utilization 5	0.215	0.610
An Eigenvalue (Eigen value)	2.778	2.494
Co-Dispersion (%)	30.866	27.707
Cumulation Variance (%)	30.866	58.572
Cronbach's α	0.827	0.756
KMO = 0.821 Bartlett χ^2 = 881.234 ($p < 0.001$)		

Factor classification was classified as a corresponding factor when the factor loading exceeded 0.50, and information utilization satisfaction and policy trust were

classified into two factors, and the two factors showed 58.572% of factor explanatory power. The first factor consisted of 'policy trust' with 4 items, and the second factor consisted of 'information utilization satisfaction' with 5 items.

In addition, the Cronbach's coefficient was 0.756 for satisfaction with information use and 0.827 for policy trust. As a result, the reliability of the measurement tool was judged to be good because all measurement tools showed a reliability index of 0.70 or more.

4.4 Correlation

Pearson's correlation analysis was conducted to understand the correlation between major variables.

Perceived usefulness is information quality ($r = 0.609$, $p < 0.001$), quality of service ($r = 0.663$, $p < 0.001$), system quality ($r = 0.582$, $p < 0.001$),There was a statistically significant positive (+) correlation with 0.001), and the perceived ease was information quality ($r = 0.398$, $p < 0.001$), quality of service ($r = 0.616$, $p < 0.001$), system quality ($r = 0.403$, $p < 0.001$)There was a statistically significant positive (+) correlation with 001).

Satisfaction with information utilization is information quality ($r = 0.541$, $p < 0.001$), quality of service ($r = 0.513$, $p < 0.001$), system quality ($r = 0.490$, $p < 0.001$). There was a statistically significant positive (+) correlation with 0.001, and perceived usefulness ($r = 0.680$, $p < 0.001$), perceived ease ($r = 0.528$, $p < 0.001$) also showed a statistically significant positive (+) correlation.

Policy trust is information quality ($r = 0.290$, $p < 0.001$), quality of service ($r = 0.436$, $p < 0.001$), system quality ($r = 0.182$, $p < 0.001$). There was a statistically significant positive (+) correlation with 001), and perceived usefulness ($r = 0.360$, $p < 0.001$), perceived ease ($r = 0.650$, $p < 0.001$). There was a statistically significant positive (+) correlation with 0.001), and a statistically significant positive (+) correlation with information utilization satisfaction ($r = 0.402$, $p < 0.001$).

Table 4 Correlation between key variables

Variable	1	2	3	4	5	6	7
1. Information quality	1						
2. Service quality	0.619***	1					
3. System quality	0.625***	0.532***	1				
4. Perceived usefulness	0.609***	0.663***	0.582***	1			
5. Perceived Ease of use	0.398***	0.616***	0.403***	0.584***	1		
6. Satisfaction with the use of information	0.541***	0.513***	0.490***	0.680***	0.528***	1	
7. Policy trust	0.290***	0.436***	0.182***	0.360***	0.650***	0.402***	1

4.5 Suitability of Measurement Model

Before conducting the structural equation model analysis, the suitability of the measurement model was verified through confirmatory factor analysis to confirm whether the observed variables explain the latent variables well. The maximum likelihood method was used to estimate the parameters of the measurement model, and the observed variables were composed of items constituting the latent variables.

Table 5 Goodness of fit of measurement model

Fitness index		Measured value	Criteria for determining suitability
Absolute fit index	$\chi^2(CMIN)p$	940.832 ($p < 0.001$)	$p > 0.05$
	$\chi^2(CMIN)/df$	2.124	$1.0 \le CMIN/df \le 3.0$
	RMSEA	0.060	≤0.08
	RMR	0.044	≤0.08
	GFI	0.827	≥0.80–0.90
Incremental fit index	*NFI*	0.817	≥0.80–0.90
	TLI	0.880	≥0.80–0.90
	CFI	0.893	≥0.80–0.90

Looking at the fit of the measurement model, the value 22 ($df = 443$) is 940.832 ($p < 0.001$). Although it was shown as 001, other goodness-of-fit indices were identified because the 2 value was greatly influenced by the size of the sample and the complexity of the model [11]. As a result, 22(*CMIN*)/*df* is 2.124, showing a value between 1 and 3, and *RMSEA* = 0.060, *RMR* = Suitable for 0.044, *GFI* = 0.827, *NFI* = 0.817, *TLI* = 0.880, *CFI* = 0.893. It was judged that the measurement model was suitable as all 893 showed good levels.

4.6 Structural Model Verification

In the structural model, the significance of the direct influence relationship between latent variables was verified.

As a result, quality of service ($\beta = 0.545$, $p < 0.001$) and system quality ($\beta = 0.342$, $p < 0.001$) was found to have a statistically significant positive (+) effect on perceived usefulness, and information quality did not have a significant positive (+) effect on perceived usefulness.

Service quality was found to have a statistically significant positive (+) effect on perceived ease ($\beta = 0.002$, $p < 0.001$), information quality and system quality did not have a significant positive (+) effect on perceived ease.

Perceived usefulness ($\beta = 0.746$, $p < 0.001$) and perceived ease ($\beta = 0.171$, $p < 0.05$) was found to have a statistically significant positive (+) effect on information utilization satisfaction.

Perceived ease ($\beta = 0.780$, $p < 0.001$) and satisfaction with information utilization ($\beta = 0.314$, $p < 0.05$) was found to have a statistically significant positive (+) effect on policy trust, and perceived usefulness did not have a significant positive (+) effect on policy trust.

Table 6 Results of direct effect analysis of structural model

Path			Non-standardized coefficient	Standard error	Standardization coefficient	Test statistics	Significance probability
Information quality	→	Perceived usefulness	0.057	0.121	0.059	0.472	0.637
Quality of service	→	Perceived usefulness	0.531	0.103	0.545	5.141***	<0.001
System Quality	→	Perceived usefulness	0.382	0.116	0.342	3.280**	0.001
Information quality	→	Perceived ease	–0.385	0.183	–0.360	–2.104*	0.035
Quality of service	→	Perceived ease	1.082	0.183	1.002	5.916***	<0.001
System Quality	→	Perceived ease	0.068	0.152	0.055	0.448	0.654
Perceived usefulness	→	Satisfaction with information utilization	0.620	0.078	0.746	7.973***	<0.001
Perceived ease	→	Satisfaction with information utilization	0.128	0.052	0.171	2.465*	0.014
Perceived usefulness	→	Policy trust	–0.448	0.180	–0.368	–2.481*	0.013
Perceived ease	→	Policy trust	0.855	0.110	0.780	7.756***	<0.001
Satisfaction with information utilization	→	Policy trust	0.459	0.231	0.314	1.990*	0.047
* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$							

4.7 In the Modified Model, the Significance of the Direct Influence Relationship between Latent Variables Was Verified

As a result, quality of service ($\beta = 0.548$, $p < 0.001$) and system quality ($\beta = 0.392$, $p < 0.001$) was found to have a statistically significant positive (+) effect on perceived usefulness, and service quality was found to have a statistically significant positive (+) effect on perceived ease ($\beta = 0.743$, $p < 0.001$).

Perceived usefulness ($\beta = 0.736$, $p < 0.001$) and perceived ease ($\beta = 0.177$, $p < 0.05$) was found to have a statistically significant positive (+) effect on information utilization satisfaction.

Perceived ease of use ($\beta = 0.790$, $p < 0.001$) and satisfaction with information utilization ($\beta = 0.324$, $p < 0.05$) was found to have a statistically significant positive (+) effect on policy trust, and perceived usefulness did not have a significant positive (+) effect on policy trust.

Table 7 Summary of hypothesis test results and mediated effect test results

Hypothesis								Result
1-1	Service quality will have a significant positive (+) effect on perceived usefulness.							Adopt
1-2	System quality will have a significant positive (+) effect on perceived usefulness.							Adopt
1-3	Service quality will have a significant positive (+) effect on perceived ease.							Adopt
2-1	The perceived usefulness will have a significant positive (+) effect on information utilization satisfaction.							Adopt
2-2	The perceived ease of use will have a significant positive (+) effect on information utilization satisfaction.							Adopt
3-1	The perceived usefulness will have a significant positive (+) effect on policy trust.							Dismiss
3-2	The perceived ease of use will have a significant positive (+) effect on policy trust.							Adopt
3-3	Satisfaction with information use will have a significant positive (+) effect on policy trust.							Adopt
Mediated effect path								Result
4-1	Service quality	Service quality	perceived usefulness			→	Policy trust	Dismiss
4-2	Service quality	→	Perceived usefulness	→	Satisfaction with the use of information	→	Policy trust	Dismiss
4-3	Service quality	Service quality	Perceived availability			→	Policy trust	Adopt
4-4	Service quality	→	Perceived availability	→	Satisfaction with the use of information	→	Policy trust	Dismiss
5-1	System quality	→	Perceived usefulness			→	Policy trust	Dismiss
5-2	System quality	→	Perceived usefulness	→	Satisfaction with the use of information	→	Policy trust	Dismiss

5 DISCUSSION AND CONCLUSION

This study was conducted using an expanded technology acceptance model to find out how quality characteristics and personal characteristics of smartphones with 5G information technology affect reuse intention and continuous use. First, the background and purpose of the study were described, the research method and the thesis composition of the previous paper were re-established, and before this study, the concept and theoretical characteristics of the independent major variables of the previous paper were studied, analyzed, and grasped.

Next, in previous studies, the relationship between independent variables was examined through a theoretical review, and based on this, 12 sub-factors constituting the independent variable were derived, measurement items were constructed through operational definition along with the dependent variable, and selected samples were verified. The objectivity of the study was secured through validity and reliability analysis of the measurement results, the study model was schematized with an expanded technology acceptance model, hypotheses were established, and major variables were empirically studied and analyzed with correlation. Exploratory factor analysis was performed to verify the validity and reliability of the measurement tool used in the study.

The principal component analysis was used to minimize information loss by extracting factors that account for as many of the original variables as possible, and to use a Verimax rotation analysis that rotates factors until the factor structure is most pronounced while maintaining factor independence. Factor classification consisted of one factor when the eigenvalue was 1 or more, and the factor load was. If it exceeded 40, it was classified as a corresponding factor.

To achieve the purpose of this study's extended technology acceptance model, technical standards and

terminology for 5G information technology were reorganized, and information quality was selected as independent variables to analyze the difference and effect of smartphone users' interests.

The trend analysis and improvement model of the expanded technology acceptance model were applied by referring to 10 overseas papers and 8 domestic papers. The effect of smartphone quality characteristics on perceived usefulness, perceived usability, and perceived playfulness was verified in detail.

Information data collection was surveyed on 519 5G users, mainly in groups using smartphones, with 259 men (49.9%), 260 women (50.1%), 130 people (25.0%) in their 20s and younger, 187 people (36.0%), 142 (27.4%) in their 40s and older (11.6%). There were 89 (17.1%) who graduated from high school or below, 338 (65.1%) who attended or graduated from vocational colleges and universities, 92 (17.7%) who attended or graduated from graduate schools, 25 civil servants (4.8%), 61 professionals (11.8%), 262 (50.5%), 71 (13.7%) and 100 others (19.3%).

The research model was set based on the extended technology acceptance model, and the results of verifying the model are as follows. The 5G user-centered research model has good exploratory factor analysis of 10 factors of network quality, cost of use, smartphone quality, social influence of individual characteristics, personal innovation, self-efficacy, perceived usefulness, perceived play, and continuous use intention. It was found to be 950, and Bartlett's sphericity test result was also significant ($p < 0.001$), so the factor analysis model was suitable, and the eigenvalue was 1.380 or higher, and the factors of 10 items showed 78.378% explanatory power, which was overall suitable and good. A path that affects continuous use intention was established by mediating the cognitive process and use satisfaction. The suitability of the model was found to be good, so it was judged that the research model was suitable.

As a result of path analysis of the research model, network quality and personal innovation were found to have a significant positive (+) effect on perceived usefulness, perceived ease, and perceived play, and user satisfaction had a significant positive (+) effect on user satisfaction.

It was verified that the positive (+) indirect effect of smartphone quality and social influence on continuous use intention was statistically significant, the positive (+) indirect effect of smartphone quality on continuous use intention was significant, and the positive (+) indirect effect of social influence on continuous use intention was verified to be significant.

In addition, smartphone quality and social influence were found to have a statistically significant positive (+) effect on perceived usefulness, smartphone quality and social influence were found to have a significant positive (+) effect on perceived play, and perceived usefulness, perceived ease, and perceived play had a significant positive (+) effect on continuous use.

5.1 Research Summary

This research was conducted using an extended technology acceptance model to investigate how the quality and personal characteristics of smartphones to which 5G information technology is applied have an effect on the intention to reuse and continuous use. First, the background and purpose of the study were described, the research method and the composition of the thesis were redefined, and prior to this study, the concepts and theoretical characteristics of the main independent variables of the previous thesis were studied, analyzed, and identified.

Next, the relationship between independent variables was examined through theoretical review in previous studies, and 12 sub-factors constituting independent variables were derived based on this, and measurement items were constructed through operational definition along with dependent variables, and verified for selected samples. The objectivity of the study was secured through the analysis of the validity and reliability of the measurement results, and after schematizing the study model into an extended technology acceptance model and establishing a hypothesis, the main variables were empirically studied and analyzed. Exploratory factor analysis was performed to verify the validity and reliability of the measurement tool used in the study. Among the factor analysis methods, principal component analysis was used to minimize information loss while extracting factors that explain as many parts of the variance of the original variables as possible, and to rotate the factors until the factor structure is most pronounced while maintaining factor independence. The factor classification was composed of one factor when the eigenvalue was 1 or more, and the factor loading amount was. If it exceeded 40, it was classified as a corresponding factor. In order to achieve the purpose of this study's expanded technology acceptance model, technical standards and technical terms for 5G information technology were reorganized, and in order to analyze the differences and effects of perceived ease of use, perceived usability, and perceived playability of smartphone users. A total of 18 previous papers were applied to the trend analysis and improved model of the extended technology acceptance model by referring to 10 overseas papers and 8 domestic papers, and the effect of smartphone quality characteristics on perceived usefulness, perceived usability, and perceived play was verified in detail. Information data collection targets 519 5G users were surveyed, centering on groups using smartphones, and the gender of the general characteristics of the study was 259 (49.9%) for men, 260 (50.1%) for women, 130 (25.0%) for those in their 20s and under, 187 (36.0%) for those in their 30s, 142 (27.4%) for those in their 50s and 60 (11.6% for those in their 50s. In terms of education, 89 students (17.1%) graduated from high school or less, 338 students (65.1%) enrolled or graduated from vocational colleges and universities, 92 (17.7%) enrolled or graduated from graduate schools, 21 (48%) professional workers, 262 (50.5%) office workers, 71 (13.7%) and 100 others (19.3%). The research model was set based on the expanded technology acceptance model, and the results of verifying the model are as follows. In the 5G user-centered research model, 5G service quality characteristic factors and personal characteristic factors are good, excluding 5 factors that hinder validity, network quality, smartphone quality, social influence of individual characteristics, personal innovation, self-efficacy, perceived

usefulness, perceived ease, perceived playfulness, and *KMO* measurement. It was found to be 950, and Bartlett's sphericity verification result was also significant ($p < 0.001$), the factor analysis model was suitable, the eigenvalue was 1.380 or higher, and the factors of 10 items showed 78.378% explanatory power, which was suitable and good overall. A path that affects the intention of continuous use was established by mediating the cognitive process and satisfaction of use. The fitness of the model was found to be at a good level, and the research model was judged to be suitable.

As a result of path analysis of the research model, network quality and personal innovation were found to have a significant positive (+) effect on perceived usefulness, perceived ease, and perceived playfulness, and user satisfaction had a significant positive (+) effect on user satisfaction. It was verified that the positive (+) indirect effect of smartphone quality characteristics and social influence on the perceived usefulness was statistically significant, the positive (+) indirect effect of smartphone quality on the perceived playability was significant. In addition, smartphone quality and social influence were found to have a statistically significant positive (+) effect on perceived usefulness, smartphone quality and social influence were found to have a significant positive (+) effect on perceived playfulness, perceived ease of use, and perceived play.

5.2 Discussions and Implications

The result that there was a significant difference in the path centered on the users of the 5G service in this study supports the research results of [9] Since the factors influencing the use of the service differ depending on whether or not the service is used, other variables should be considered in order to increase the intention to use the service for each user group. It has been verified that it is necessary to increase user satisfaction in order to induce 5G users to continue to use 5G services, and to increase user satisfaction, it is necessary to increase perceived usefulness, perceived ease, and perceived playability. In addition, in order to increase perceived usefulness, perceived ease of use, and perceived playability, improving network quality and personal innovation was suggested as a valid way. In other words, higher network quality applying 5G service technology will improve perceived usefulness, perceived ease, and perceived playability, increasing satisfaction with information utilization, and eventually positively influencing users' intention to use 5G service. Therefore, it is necessary to invest at the national level to improve the quality of online platforms. However, Korea, which commercialized 5G services for the first time in the world, also lacks foundation, platform, and application-related pools. In the future, it is necessary to improve service quality by investing in facilities related to 5G. The results of this study are expected to be used as evidence for improving smartphone quality applying domestic 5G service technology, intention to use subscriber information, and base data for information utilization. Therefore, for the development of the fourth industry at the national level, it is necessary to establish and actively support multimedia Big DATA Service that specializes in real-time interaction such as artificial intelligence (AI), augmented reality (AR), virtual reality (VR), and real-time online games. In order to improve the quality of information utilization, the information center, which is always managed, needs to be fully confirmed even if it is inconvenient to train and use certification and verification agencies along with AI and Big DATA security technology. In addition, an institution that can always monitor and control defective information by publicly authenticating the information and communication countries and platforms based on artificial intelligence networks will be needed, and short-term, medium- and long-term plans should be made every year. And it can be seen that this study contributed to the following aspects. First, the actual needs and phenomena were sufficiently reflected because the actual experiences of smartphone users related to actual information were analyzed. Second, the perceived usefulness, perceived ease, and perceived playability according to information quality were analyzed to derive the importance between factors of information quality as an expanded technology acceptance model. Third, by examining the satisfaction level of information use according to the perceived usefulness, ease of use, and perceived playability, it was confirmed with an expanded technology acceptance model which part to focus more on to increase the satisfaction level of information use. Fourth, by analyzing the impact on the intention to use information, it researched, analyzed, and confirmed what factors should be emphasized, analyzed, and nurtured in order to increase the intention of existing service users to use and secure new users in the future. This study is the world's first paper on 5G information technology built on April 3, 2019, and summarizes the latest trends and issues related to the opening of information and communication by using smartphone-applied information technology. Based on this, 5G information technology was defined as a broad concept from basic definition, and the information quality of 5G technology was analyzed and summarized by considering previous studies. It is also important to investigate how characteristic factors such as information quality, system quality, and service quality influence from the perspective of the expanded technology acceptance model and how these influencing factors affect perceived ease, perceived usefulness, and perceived play.

5.3 Contributions and Important Points of Research

It can be seen that this study contributed to the following aspects.

First, the actual information-related experiences of smartphone users were analyzed and the actual needs and phenomena were sufficiently reflected and compared.

Second, the importance between information quality factors was compared and derived with an expanded technology acceptance model by analyzing the perceived usefulness and perceived convenience of use according to information quality.

Third, we investigated the satisfaction level of information use according to perceived usefulness and ease of use, and compared and analyzed areas that should focus more on information use satisfaction through an expanded technology acceptance model.

Fourth, by analyzing the impact on the reliability of government policies, the research analysis confirmed what factors should be emphasized and fostered in order to increase trust in government policies in the future.

This study summarizes the latest trends and issues related to the opening of information policy as a research paper on how information use and user satisfaction will affect government policies using smartphone-applied information technology without existing research on 5G in the world. Based on this, 5G information technology was defined as a broad concept from the basic definition, and the information quality of information transmission was summarized through insufficient prior research.

It is also important to investigate how characteristic factors such as information quality, information system quality, and information service quality affect user satisfaction and policy trust in perceived ease of use and perceived ease of use.

As such, the public's requirements for new information quality, information application services, and product development continue to increase, but actual facility investment and support for it are still insignificant, and it is necessary to maximize the infinite value of use directly or indirectly. In order to maximize the value of using such information, it is necessary to establish a center that develops and provides compatible information systems for convenience of use and to connect to various infrastructure and platforms, and to continuously improve the use environment. Another problem of the domestic public information and communication centers is that information opening is still limited due to information security, and above all, the issue of establishing national standards for information formats such as standardization of information should be continuously researched and analyzed.

In addition, even if information delivery customer services are commercialized into the private sector, it is very important to ensure the quality, certification, and verification of actual information services as similar information services may become competitive.

From the perspective of raising the government's public awareness, improving people's understanding of government policies, and enhancing people's feelings, it is desperately necessary to actively implement public relations policies and develop more active public relations activities. In order to improve the public's sense of information service through 5G, it is important for all citizens to feel the public's public interest, and by holding ideas and competitions on a regular basis, various events and plans should be published, and public relations and educational activities should be systematically conducted. The use and ease of information services affect the satisfaction of use, and this satisfaction of use affects the trust of policy, so the government should establish a national strategy for the promotion of information use and the satisfaction of users and developers.

6 REFERENCES

[1] Davis, F. D. (1986). *A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results*. Sloan School of Management, Massachusetts Institute of Technology.

[2] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340, JSTOR 249008, S2CID 12476939. https://doi.org/10.2307/249008

[3] Fishbein, M. & Ajzen, I. (1975). Belief, Attitude, Intention, and Behavior Addison-Wesley. Reading, MA.

[4] Xia, W. & King, W. (1996). Interdependency of the Determinants of User Interaction and Usage: An Empirical Test. *ICIS 1996 Proceedings*, 1.

[5] Koo, J.-C. (2008). User Selection Characteristics Analysis Technology Product: Development of Technology Product Selection Model. *Doctoral dissertation* at Graduate School of Kyung Hee University.

[6] Son, S.-H. (2011). A study on smartphone adoption behavior of early users using technology acceptance models. *Korean Journalism Society, 55*(2), 227-251.

[7] Kim, S.-H. (2016). A Study on Secure Data Management and Access Control in Cloud Computing Environments. *Doctoral dissertation* at Graduate School of Soonchunhyang University.

[8] Lee, S.-T. (2017), A study on the effect of using an online start-up education platform on college students' willingness to start a business: focusing on the moderating effect of the degree of self-determination. *PhD thesis* at Soongsil University Graduate School.

[9] Jeong, M.-S. (2020). Study on the factors affecting the usage intentions of 5G mobile communication service. *Doctoral dissertation* at Yonsei University Graduate School.

[10] Byeongryul, B. (2014). Amos 21 Structural Equation Modeling, 2014 Seoul: Cheongram. https://doi.org/10.1080/10705511.2014.919820

[11] Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis* (Vol. 6).

Author's contacts:

Chil-Yuob Choo, Dr.
Donghyun Professional Engineers Office,
Kolon Science Valley 1st 11th floor, 43, Digital-ro 34-gil, Guro-gu,
Seoul, South Korea
Smartphone +82-10-7470-6688 / Tel 02-2025-2720 / Fax 042-271-9797
choocy@naver.com