Technology Acceptance Model for Direct-to-Consumer Genetic Testing Service

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소비자대상직접시행 유전자검사서비스의 기술수용모델

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The purpose of this study is to identify factors that influence consumers' acceptance intentions towards Direct-to-Consumer (DTC) Genetic Testing service. DTC genetic testing service can be considered in two aspects: the application of new technology in genetic testing customers can directly purchase and the services for receiving the test results customer can't directly analyze. Existing technology-based acceptance models have difficulty fully explaining consumers' acceptance intentions towards DTC genetic testing services. Therefore, this study aims to propose a new acceptance model considering these two characteristics. A survey was conducted with 377 potential consumers for this research. The analysis revealed that health interest, prior knowledge, subjective norms, innovativeness, perceived usefulness, and perceived value affect consumers' acceptance intentions. The results obtained through this study can help establish strategies and marketing plans necessary for the diffusion of services, such as DTC genetic testing services, that combine a new technology and a service. In the long term, the accumulated DTC genetic testing results data can contribute to the development of national genetic information infrastructure and preventive medical applications, as well as improve individuals' quality of life.

Keywords : Direct-to-Consumer Genetic Testing Service, Technology Acceptance Model, Social Influence, Innovativeness

1. Introduction

DTC genetic testing service allows that individuals can directly request DTC genetic testing services through genetic testing institutions that have the evaluation and certification for DTC genetic testing agencies. The consumers can purchase a DTC genetic testing kit and use this service directly without

going through medical institutes or without involving medical experts. Through these services, consumers can obtain information about their genetic lineage, physical characteristics, nutritional status, and suitable lifestyle habits. Consumers can use the test results as a guideline for changing their lifestyle habits healthily or as a basis for visiting medical institutions. Also, individuals can achieve information which they need to fill in missing elements or choose supplements that are good for the consumers' health [15-16, 38]. Moreover, the accumulated DTC genetic testing results could have a significant impact on the development of related industries and

the improvement of individuals' healthy quality of life. It is expected that this will improve the quality of personal life and reduce medical costs in the long term. Also, they can be utilized for the establishment of a national genetic information system, the development of new drugs and treatments for various genetic diseases, as well as preventive medical applications. As a result, South Korea government began to relax regulations, and finally introduced the 'Direct-to-Consumer Genetic Testing Competency Certification System (DTC Competency Certification System)' from July 2022, allowing the DTC genetic testing service to be used in earnest [33]. However, despite these advantages, DTC genetic testing services are still in the early stages of diffusion and are not yet widely adopted [23]. Therefore, research on the acceptance of DTC genetic testing, which can help individuals improve their health, is essential.

Existing research on technology acceptance models for products applying new technology is exemplified by Davis [9]. According to Davis [9], the crucial factors in consumers' adoption of new products are usefulness and ease of use. Since the acceptance of new products applying IT technology depends significantly on how easily the new technology can be utilized and how it can improve their work performance [9]. As new technologies diversified beyond IT, technology acceptance models expanded by adding external variables to increase explanatory power according to each product's characteristics and environment [40]. However, most of these initial and expanded technology acceptance models are about user's acceptance intentions for new technologies introduced by organizations for improving work efficiency within organizations [10]. Therefore, most of these acceptance models do not consider the motivation and cost of voluntary acceptance from an individual perspective on new technologies.

In order to reveal individuals' motivations for adopting new technology, Venkatech and Davis [40] introduced the Subjective Norm variable, which was studied in the Theory of Reasoned Action by Fishbein and Ajen[12]. Individuals are in an environment where they can easily share their thoughts and interests with others due to the development of social media platforms such as SNS. Therefore, Subjective Norms, which represent the influence of others on the acceptance of new technology, can be considered an essential factor. On the other hand, Lin et al. [28] considered the cost associated with adopting new technology. Most technology acceptance models focused on organizational adoption and did not discuss cost factors. Instead, they considered the benefits users could gain from adopting the technology. However, when individuals are the primary adopters of technology, cost factors can also be crucial. Consequently, Kim et al proposed a value-based new technology acceptance model that considers both factors [22]. Research on the acceptance of DTC genetic testing can apply existing extended technology acceptance models for new products since ordinary individuals use kits applying new technology. However, this research requires a new acceptance model considering both technology and services provided by DTC genetic testing service institutions. Therefore, this study aims to propose a new acceptance model that includes technical and service factors to identify the factors influencing individuals' acceptance of DTC genetic testing.

2. Conceptual Background and Hypotheses

<Figure 1> shows the proposed model which includes additional constructs representing personal orientation (Innovativeness), personal readiness (Health Interest and Prior Knowledge), and social influence (Subjective Norm). Followings
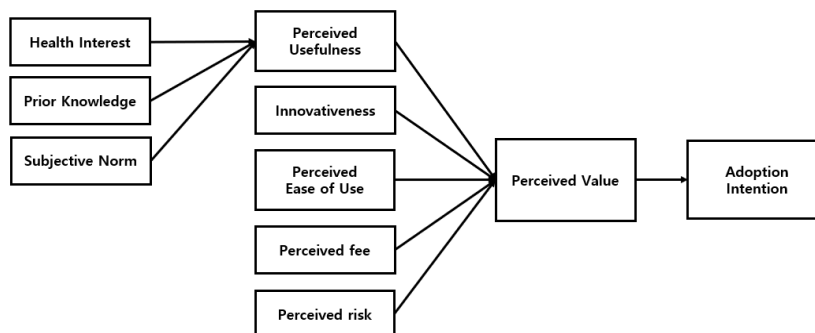
<Figure 1> Proposed Hypothesized Model

are conceptual backgrounds of each construct and underlying rationale of the hypotheses.

2.1 Subjective Norm and Perceived Usefulness

Subjective Norm (SN) is a key factor representing social influence on technology adoption as used in TAM [9, 10]. We incorporate SN to capture social influence and it is defined as "a person's perception that most people who are important to him think he should or should not perform the behavior in question." [12]. Fishbein and Ajzen [12] and Ajzen [1] used SN as a direct predictor of behavioral intention.

The direct relationship between SN and behavioral intention is due to the fact that an individual may intend to perform a behavior if advised by significant social actors or if they perceive that these actors believe they should, regardless of their own views on the matter or its consequences. However, it can be said that the situation of compliance, where individuals follow the expectations of referents even when they have no preference for the behavior themselves, is very limited [14, 41]. As a result, the direct effect of SN on behavioral intention has been found to be insignificant in many studies [4, 29]. Instead, in most research on acceptance models, SN is considered as a direct determinant of Perceived Usefulness (PU) [40]. In this context, informational social influence is more appropriate to represent SN rather than normative social farce [11, 40]. The rationale for a direct effect of SN on PU is that an individual may think that the system is useful by accepting his important referents' information on its usefulness [11, 34, 40]. That is, in our context, an individual may come to think of that a tech-based genetic testing service might be useful if a professional or someone who is credible to him advises that it is useful. Our model theories that a target individual's perception on usefulness will increase in response to an informational social influence.

Hypothesis 1: SN will have a positive effect on PU.

2.2 Health Interest and Perceived Usefulness

It has been found that the higher a person's belief in health, the higher their adherence to health behaviors [21] and the higher their health interest (HI), the higher their purchasing behavior for eco-friendly agricultural products [27]. In Zekun Zheng's study, it was observed that the perceived severity of diseases among smartphone users influenced their intention to use healthcare applications [45]. The relationship between health preventive behaviors and perceived health sensitivity among teenagers during the COVID-19 pandemic was examined, and through this research, it was found that health interest affects the intention of various health-related behaviors [39]. In this study, it was assumed that such interest in health would make individuals feel more usefulness for DTC genetic testing.

Hypothesis 2: HI will have a positive effect on PU.

2.3 Prior Knowledge and Perceived Usefulness

In a study investigating the factors that influence the purchase intention and purpose of DTC genetic testing, it was reported that experience-based prior knowledge (PK) had a significant influence on purchase intention [32]. There was also research indicating that prior knowledge influenced the decision-making process for medical tourists who traveled to receive medical services [42]. In this regard, it was assumed that consumers would perceive the usefulness of health-related services and proceed with purchases based on their prior knowledge. In addition, the influence of prior knowledge on purchasing or service selection has been observed not only in medical-related cases but also in restaurant smartphone applications and low-cost airline usage [26, 31]. Therefore, it was hypothesized that prior knowledge would influence the perceived usefulness in the acceptance intention of DTC genetic testing.

Hypothesis 3: PK will have a positive effect on PU.

2.4 Innovativeness and Perceived Value

Innovativeness is characterized by the ease with which a person adopts new technologies ahead of others, resulting in greater confidence compared to those with lower innovativeness [18, 30]. This is because highly innovative consumers find intrinsic value in pursuing newness and are therefore more willing to positively embrace perceived risks and uncertainties [19, 35]. According to previous research, a structural equation analysis of data collected from online travel community users showed that individual innovativeness had a positive influence on perceived value [8]. Additionally, individual innovativeness was found to affect usage intention in adopting mobile web browsing services [36], and it also had a positive

impact on the acceptance of IPTV services [43]. Based on these findings, we hypothesized that individual who adopt DTC genetic testing services will similarly perceive higher value through the factor of innovativeness.

Hypothesis 4: Innovativeness will have a positive effect on PV.

2.5 Perceived Usefulness and Perceived Value

A study on delivery services based on applications found that perceived usefulness had a significant influence on perceived value (PV) [44] Moreover, research utilizing the VAM (Value-based Adoption Model) examined the relationship between perceived usefulness and perceived value for fast-food kiosk systems, revealing a positive relationship [20]. In a study on the usage intention of autonomous vehicles, it was found that perceived usefulness had a positive effect on perceived value based on the VAM theory [5]. During the COVID-19 pandemic, a study on the acceptance model of Internet Health Care Technology (HIT) in China based on VAM also reported a positive effect of perceived usefulness on perceived value [6]. As such, various service acceptance models based on applications, healthcare-related new technologies, and other new technologies and products reveal the positive relationship between perceived usefulness and perceived value, which are the main explanatory variables in the VAM. Therefore, we hypothesized that perceived usefulness would also have a positive effect on perceived value in the acceptance model of DTC genetic testing.

Hypothesis 5: PU will have a positive effect on PV.

2.6 Perceived Ease of Use and Perceived Value

Research on the positive influence of perceived ease of use (PEU) on perceived value and purchase intention in various types of service areas using mobile applications and the internet is widely conducted. Yun and Jeon's study on consumers using delivery applications revealed that perceived ease of use had a positive influence on perceived value [44]. In a study on consumers using online subscription-based services, complex menus and additional services negatively affected both emotional and functional value, confirming that the higher ease of use, the higher the perceived value [2]. We hypothesized

that, in DTC genetic testing where items are selected, services are applied, and results are checked through on-line or mobile applications, perceived ease of use and perceived value would also have a positive relationship.

Hypothesis 6: PEU will have a positive effect on PV.

2.7 Perceived Fee and Perceived Value

Based on the general assumption that perceived Fee (PF) will have a negative impact on the value of a service, previous studies have reported that people who use food delivery applications perceive the cost to have a negative influence on perceived value [24]. Furthermore, an analysis of data collected from users of technology-based self-service systems has shown that cost has a negative impact on system value and functional value. In the case of DTC genetic testing, it is difficult to attribute the limited use of the service solely to cost, as safety concerns, opposition from the medical experts, strict regulations have limited its use since it became available in Korea in 2016. Since the introduction of DTC Competency Certification System in July 2022, DTC service companies have not only promoted their services but also carried out advertising activities through free events and collaboration with third parties. By these activities, they have been working to improve social awareness of DTC genetic testing. Therefore, it is necessary to verify whether the cost has a negative impact on perceived value, ultimately leading to the adoption intention of DTC genetic testing.

Hypothesis 7: PF will have a negative effect on PV.

2.8 Perceived Risk and Perceived Value

DTC genetic testing is a service that is applied for through the online or applications, and the results are received without having to visit a facility, also through the online or applications. This may result in potential risks such as personal information exposure and the misuse of consumers' genetic information by the testing companies, which could negatively influence the perceived value of DTC genetic testing. In previous studies, older adults who adopted Home Telehealth Service (HTS) were influenced by perceived security, suggesting that marketing activities emphasizing safety are necessary when promoting HTS [7]. Similarly, perceived risk (PR) has been reported to have significant impact on inhibiting the adoption of online

second-had trading platform [37]. Based on these prior research findings, it is posited that the use of DTC genetic testing services through online platforms or mobile applications may potentially be perceived negatively by users due to associated risks.

Hypothesis 8: PR will have a negative effect on PV.

2.9 Perceived Value and Adoption Intention

The relationship between perceived value and adoption intention has already been established in the VAM itself, and there have been numerous related studies. In particular, research on the adoption intention of internet healthcare technology has shown that various factors influence the perceived value, which in turn has a positive impact on adoption intention (AI) [6]. Another study on consumer behavioral intention in sports O2O (Online to Offline) services using the VAM also demonstrated that perceived value has a positive influence on behavioral intention [25]. Therefore, it was assumed that in the adoption model for DTC genetic testing services, perceived value would have a positive influence on adoption intention.

Hypothesis 9: PV will have a positive effect on AI.

3. Result

3.1 Data Collection and Sample

To confirm the acceptance intention of general consumers for DTC genetic testing, a survey was conducted targeting various age groups residing in South Korea. However, DTC genetic testing is only legal for those aged 20 and above because genetic testing result may have negative psychological and social impacts on teenagers. Therefore, this study excluded that age group from the survey. The survey was conducted online through a professional survey agency from July 10th to July 13th, 2023, targeting Korean nationals across the country, and a total 377 survey responses were collected and used for data analysis. The demographic characteristics of the research subjects who participated in the survey are summarized in <Table1>.

The gender of the respondents was 51.2% female and 48.8% male, slightly more female respondents. The largest age group of respondents was those in their 40s at 22.8%, while the other age groups were evenly distributed at around 19%. Office workers were the most common occupation at 35.5%. Most of the respondents were college students or graduates, accounting for 65.3%, and the majority of the respondents resided

<Table 1> Demographic Description

Demographic Characteristics		Frequency	Ratio (%)	Demographic Characteristics		Frequency	Ratio (%)
Gen-der	Male	184	48.8	Region	Seoul	99	26.3
	Female	193	51.2		Busan	17	4.5
Age	20-29	75	19.9		Daegu	22	5.8
	30-39	73	19.4		Incheon	23	6.1
	40-49	86	22.8		Gwangju	10	2.7
	50-59	73	19.4		Daejeon	15	4.0
	60 ~	70	18.6		Ulsan	4	1.1
Occupation	Students	30	8.0		Gyeonggi	111	29.4
	Office worker	134	35.5		Gangwon	7	1.9
	Professional	39	10.3		Chung Buk	5	1.3
	Service worker	20	5.3		Chonnam	12	3.2
	Self-employed	31	8.2		Jeonbuk	5	1.3
	Housekeeper	52	13.8		Jeonnam	5	1.3
	Labor	20	5.3		Kyung-pook	14	3.7
	Unemployed	36	9.5		Kyung-nam	20	5.3
	Others	15	4.0		Jeju	2	0.5
Education	Middle School	2	0.5		Sejong	6	1.6
	High school	73	19.3				
	College	246	65.3				
	Graduate School	56	14.9				

in Seoul and Gyeonggi province, with 26.3% and 29.4% respectively, indicating that most respondents were from the metropolitan area.

3.2 Model Validity

First, PLS-SEM bootstrapping was conducted to verify the reliability and validity of the scales composing the measurement model. To analyze the reliability of individual measurement variables, factor loadings were checked, and the values all showed adequate fit at 0.7 or higher [3, 17]. Additionally, Cronbach's α, CR, and rho(ρ)_α were calculated to confirm the internal consistency reliability, and all three values showed desirable reliability at 0.7 or higher. As a result of

<Table 2> Reliability and Convergent Validity Analysis

Variables		Factor Loading	Cronbach's α	rho(ρ)_α	CR	AVE
Health Interest (HI)	Health_1	0.823	0.831	0.840	0.887	0.663
	Health_2	0.853				
	Health_3	0.770				
	Health_4	0.810				
Prior Knowledge (PK)	Knowledge_1	0.805	0.859	0.864	0.904	0.702
	Knowledge_2	0.851				
	Knowledge_3	0.844				
	Knowledge_4	0.851				
Subjective Norm (SN)	Norm_1	0.760	0.780	0.784	0.858	0.602
	Norm_2	0.787				
	Norm_3	0.802				
	Norm_4	0.753				
Innovativeness	Inno_1	0.825	0.866	0.870	0.908	0.712
	Inno_2	0.857				
	Inno_3	0.809				
	Inno_4	0.882				
Perceived Usefulness (PU)	Useful_1	0.798	0.812	0.812	0.876	0.639
	Useful_2	0.801				
	Useful_3	0.805				
	Useful_4	0.793				
Perceived Ease of Use (PEU)	EOU_1	0.826	0.880	0.886	0.917	0.735
	EOU_2	0.819				
	EOU_3	0.888				
	EOU_4	0.894				
Perceived Fee (PF)	Fee_1	0.951	0.810	1.310	0.841	0.643
	Fee_2	0.679				
	Fee_3	0.750				
Perceived Risk (PR)	Risk_1	0.848	0.843	0.880	0.887	0.665
	Risk_2	0.897				
	Risk_3	0.827				
	Risk_4	0.673				
Perceived Value (PV)	Value_1	0.806	0.807	0.811	0.873	0.633
	Value_2	0.793				
	Value_3	0.754				
	Value_4	0.829				
Adoption Intention (AI)	Intention_1	0.863	0.854	0.856	0.901	0.695
	Intention_2	0.841				
	Intention_3	0.814				
	Intention_4	0.817				

measuring the average variance extracted (AVE), all measured variables were verified for convergent validity with values above 0.5 [13].
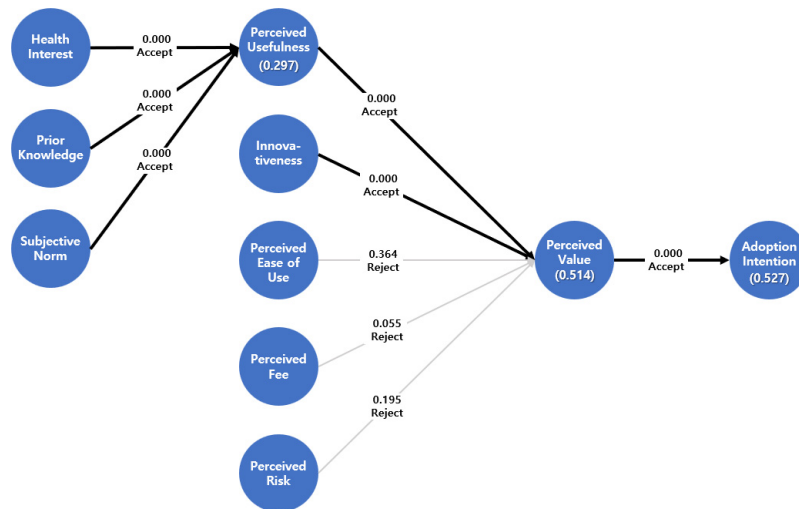
3.3 Hypotheses Verification

Upon checking the path coefficients and P-values, it was found that health interest, prior knowledge about health, and subjective norm had a positive influence on perceived usefulness. The hypothesis that perceived usefulness and innovativeness would have a positive impact on perceived value was adopted, but the hypothesis that perceived fee and perceived risk would have a negative impact on perceived value was rejected. In addition, we assumed that perceived ease of use would have a positive effect on perceived value was rejected. The hypothesis that perceived value would have a positive impact on acceptance intention was adopted, as we expected. In particular, it was strongly demonstrated that perceived usefulness significantly influenced acceptance intention through perceived value, as verified in the existing VAM [22]. Based on the values measured so far, the DTC genetic testing acceptance model summarized in <Table 3> can be proposed as follows.

This study aims to identify the factors influencing consumer acceptance of DTC genetic testing service during the early adoption phase. To this end, we employed TAM (Technology Acceptance model), TRA (Theory of Reasoned Action) and VAM (Value-based Adoption Model) to explore the intention to accept this service. As shown in <Figure 2>, we elucidated the relationships between the variables and their explanatory power. This approach helped to sufficiently support the intention to accept the DTC genetic testing service by incorporating unique characteristics specific to DTC, which were not fully explained by TAM alone. The study revealed that the health-related aspect of DTC genetic testing, such as 'Health Interest', positively influences the intention to accept through Perceive Usefulness, similar to findings in other studies. Consistent with previous research, which indicated that Prior Knowledge affects an acceptance intention for medical tourism and health-related product, PK also had a positive impact on the acceptance of DTC genetic testing. Moreover, to explain the behavior of sharing DTC genetic test results with others or displaying them on social media, we included Subjective Norm and Innovativeness as additional variables. It was found

<Table 3> Path Coefficients and P-values

Hypotheses		Original Sample	P value	Result
Path Coefficients				
H1	SN will have a positive effect on PU.	0.365	0.000	Accept
H2	HI will have a positive effect on PU.	0.213	0.000	Accept
H3	PK will have a positive effect on PU.	0.196	0.000	Accept
H4	Innovativeness will have a positive effect on PV.	0.171	0.000	Accept
H5	PU will have a positive effect on PV.	0.609	0.000	Accept
H6	PEU will have a positive effect on PV.	0.042	0.364	Reject
H7	PF will have a negative effect on PV.	0.100	0.055	Reject
H8	PR will have a negative effect on PV.	0.050	0.195	Reject
H9	PV will have a positive effect on AI.	0.726	0.000	Accept
Indirect Effects				
SN → PU → PV		0.222	0.000	Accept
SN → PU → PV → AI		0.161	0.000	Accept
HI → PU → PV		0.130	0.000	Accept
HI → PU → PV → AI		0.094	0.000	Accept
PK → PU → PV		0.119	0.000	Accept
PK → PU → PV → AI		0.086	0.000	Accept
Innovativeness → PV → AI		0.124	0.000	Accept
PU → PV → AI		0.442	0.000	Accept
PEU → PV → AI		0.030	0.364	Reject
PF → PV → AI		0.073	0.056	Reject
PR → PV → AI		0.037	0.197	Reject

<Figure 2> Hypothesized Model Verification

that a positive reputation among peers or the people who the consumers think important, positively influences acceptance intention. It was also confirmed that rather than Perceived Fee or Perceived Risk, the willingness to adopt innovative new technologies had a more significant positive effect in DTC genetic testing acceptance intention. Additionally, as well-established in the VAM model, not the consumers are testing DTC genetic testing itself, but the consumers are requesting the service to the DTC genetic testing service institutions. This is consistent with the suggestion presented by VAM model, and it is aligned with the added variables in the acceptance model of DTC genetic testing services which are enhance Perceived Value and finally increase the intention to accept these services.

4. Discussion and Research Limitations

This study aimed to reveal the acceptance intention of early adopters in the initial adoption stage of DTC genetic testing, integrating existing models such as TAM, TRA and VAM. Through PLS-SEM and structural equation modeling, the established hypotheses were tested, and the relationships and explanatory power between variables were measured. As a result, it was found that health interest, prior knowledge, and subjective norm positively influenced acceptance intention through perceived usefulness and perceived value. Therefore, emphasizing the provision of health-related information and promoting the usefulness and value of such information in supporting a healthy lifestyle could effectively increase the acceptance

intention of DTC genetic testing. In addition, since it is Direct-to-Consumer genetic testing, not conducted through medical institutes, emphasizing the innovativeness of DTC genetic testing appears to be an effective marketing strategy for companies to increase the number of early adopters. Adopting and utilizing these services quickly, as seen in other countries cases, could be effectively promoted through strategic messaging that highlights the potential benefits of DTC genetic test results, such as lifestyle improvements and dietary changes tailored to an individual's genetic profile, which can lead to improved self-perception based on feedback from others [15, 38]. Furthermore, among those in their 20s and 30s, who have shown significant interest in DTC genetic testing, the behavior of sharing test results with close people or posting them on social media can be explained by their personal innovativeness. This demographic perceives value in the fact that they can quickly and easily adopt innovative new technologies or services. Such an approach, customized to the characteristics of this generation, could serve as a strategic foundation for expanding the adoption of DTC genetic testing services among specific target groups. However, perceived ease of use, perceived fee, and perceived risk, which were assumed to have positive or negative effects, were not supported. This requires further studies and discussion.

First, considering the rejection of the hypothesis that perceived ease of use positively influences acceptance intention, DTC genetic testing is highly innovative as it allows consumers to select specific items for genetic testing service directly without a medical expert. According to Rogers' book (2003), consumers adopt innovative new technologies when they per-

ceive a relative advantage rather than absolute benefits. Perceived ease of use can also be considered relatively [35].

Second, the rejection of the hypothesis that perceived fee negatively influences acceptance intention may require more complex discussions. In the circumstance of South Korea, the perception of DTC genetic testing may have been elevated through ongoing daily free events offered on a first-come, first-served basis and collaborative services with other companies. These factors may have reduced the perceived financial burden for those who have already experienced DTC genetic testing services through these events. Additionally, individuals with a high propensity for innovation tend to adopt new technologies without considering costs. Therefore, this aspect warrants separate investigation.

Finally, considering the rejection of the hypothesis regarding perceived risk, it may be attributed to the nature of early adopters who are willing to embrace perceived risks and uncertainties when adopting innovative new technologies. Furthermore, in today's society, where online services are prevalent, and ordering and receiving results via applications have become commonplace, the perceived risk of utilizing DTC genetic testing services online may be diminished [19].

Based on these results, the implications of this study can be summarized as follows:

First, this study provides a theoretical basis for explaining the behavior of consumers who adopt DTC genetic testing in Korea. To date, research on DTC genetic testing in Korea has predominantly focused on policy, social, and ethical aspects rather than consumer perspectives. From this viewpoint, it is significant as a study that explains the intention to adopt DTC genetic testing using an acceptance model.

Second, unlike when the TAM was first introduced, today's society sees a convergence of IT and healthcare, with many new products and services integrating with each other. Thus, it is limited to explain these convergent new products and services with a single model such as TAM, TRA or VAM. This study's proposal of an integrated acceptance model to explain the adoption of such convergent new products and services is meaningful.

However, as discussed when explaining the rejected variables, this study has limitations and areas that require further studies. First, this study focuses on domestic consumers, and the unique background of DTC genetic testing in Korea should be considered. Second, Korea is in the stage where DTC genetic testing is beginning to spread, and since the introduction of the DTC Competency Certification System, services have

diversified, and full-scale promotions have been conducted. Therefore, it is necessary to compare pre- and post-Competency Certification system introduction or conduct a time-series study to identify changes in factors affecting adoption intention. Third, as previously mentioned, among the rejected variables, perceived fee in DTC genetic testing particularly needs to be studied by distinguishing between free event participants and actual purchasers.

References

[1] Ajzen, I., The theory of planned behavior, *Organizational Behavior and Human Decision Processes*, 1991, Vol. 50, No. 2, pp. 179-211.

[2] Baek, N.G., A Study on Effect of The Subscription – Based Online Service on Consumer Perception Value, Repurchase Intention, *Korea Customer Satisfaction Management Association*, 2021, Vol. 23, No. 2, pp. 49-71.

[3] Bagozzi, R.P., Youjae, Y., and Phillips, L.W., Assessing Construct Validity in Organizational Research, *Administrative Science Quarterly*, 1991, Vol. 36, No. 3, pp. 421-458.

[4] Barki, H. and Hartwick, J., Measuring User Participation, User Involvement, and User Attitude, *MIS Quarterly*, 1994, Vol. 18, pp. 59-82.

[5] Beck, S.Y., Factors affecting Adoption Intention of Autonomous Vehicle, *Journal of Venture Innovation*, 2022, Vol. 5, No. 4, pp. 91-108.

[6] Bian, D., Xiao, Y., Song, K., Dong, M., Li, L., Millar, R., Shi, C., and Li, G., Determinants Influencing the Adoption of Internet Health Care Technology Among Chinese Health Care Professionals: Extension of the Value-Based Adoption Model With Burnout Theory, *Journal of Medical Internet Research*, 2023, Vol. 25, p. e37671.

[7] Cimperman, M., M., Brenčič, M., and Trkman, P., Analyzing older users' home telehealth services acceptance behavior—applying an Extended UTAUT model, *International Journal of Medical Informatics*, 2016, Vol. 90, pp. 22-31.

[8] Chung, N.H., Han, H.J., and Gretzel, U., The Determinants of Perceived Value and Information Sharing Satisfaction in the Online Travel Communities: Personal Innovativeness, Innovation Resistance, and Technicality, *Korea Customer Satisfaction Management Association*, 2014, Vol. 16, No. 1, pp. 43-63.

[9] Davis F.D., Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, *MIS Quarterly*, 1989, Vol. 13, No. 3, pp. 319-340.

[10] Davis, F.D., Bagozzi, R.P., and Warshaw, P.R., User Acceptance of Computer Technology: A Comparison of Two Theoretical Models, *Management Science*, 1989, Vol. 35, No. 8, pp. 982-1003.

[11] Deutsch, M. and Gerard, H.B., A study of normative and informational social influences upon individual judgment, *The Journal of Abnormal and Social Psychology*, 1955, Vol. 51, No. 3, pp. 629-636.

[12] Fishbein, M. and Ajzen, I., *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*, Reading, MA: Addison-Wesley, 1975.

[13] Fornell, C. and Larcker, D.F., Evaluating Structural Equation Models with Unobservable Variables and Measurement Error, *Journal of Marketing Research*, 1981, Vol. 18, No. 1, pp. 39-50.

[14] French, J. and Raven, B., The bases of social power, *Studies in social power/Institute for Social Research*, 1959, Vol. 6, pp. 151-164.

[15] Green, R.C. and Farahany, N.A., The FDA is overcautious on consumer genomics, *Nature*, 2014, Vol. 505, No. 7483, pp. 286-287.

[16] Group, P.G.S., Ostergren, J.E., Gornick, M.C., Carere, D.A., Kalia, S.S., Uhlmann, W.R., Ruffin, M.T., Mountain, J.L, Green, R.C., and Robert, S., How Well Do Customers of Direct-to-Consumer Personal Genomic Testing Services Comprehend Genetic Test Results? Findings from the Impact of Personal Genomics Study, *Public Health Genomics*, 2015, Vol. 18, No. 4, p. 216.

[17] Hair, J.F., Ringle, C.M., and Sarstedt, M., PLS-SEM: Indeed a Silver Bullet, *Journal of Marketing Theory and Practice*, 2011, Vol. 19, No. 2, p. 139.

[18] Jayanti, R. and Jackson, A., Service Satisfaction; An Exploratory Investigation of Three Models, *Advances in Consumer Research*, 1991, Vol. 18, No. 1, pp. 603-610.

[19] Joseph, B. and Vyas, S.J., Concurrent Validity of a Measure of Innovative Cognitive Style, *Journal of the Academy of Marketing Science*, 1984, Vol. 12, No. 2, pp. 159-175.

[20] Kim, D.B. and NamKung, Y., The effect of Fast Food Consumers' Perceived Usefulness and Security Risk toward Self-Service Kiosk on Perceived Value and Behavioral Intention: Value based Adoption Model (VAM), *Journal of Foodservice Management Society of Korea*, 2019, Vol. 22, No. 1, pp. 307-337.

[21] Kim, E.J. and Moon, I.O., A Study on Middle Aged People's Compliance for Preventive Health Behavior or Cancer, *The Journal of Korea Society for Health Education*, 1987, Vol. 4, No. 2, pp. 9-31.

[22] Kim, H.W., Chan, H.C., and Gupta, S., Value-based Adoption of Mobile Internet: An empirical investigation, *Decision Support Systems*, 2007, Vol. 43, No. 1, pp. 111-126.

[23] Kim, I.Y., The latest trend in personalized services using DTC genes, *BRIC View*, 2021, Vol. T29, pp. 1-17.

[24] Kim, M.J. and Lee, S.B., The Effect of the Perceived Cost on Perceived Value and Innovation Resistance in the Mobile Convergence Environment: Focused on Delivery Application Users in the Food Industry, *The Korea Academic Society of Tourism and Leisure*, 2018, Vol. 30, No. 3, pp. 247-264.

[25] Lee, H.M., Han, J.W., and Lee, I.Y., Predicting Consumption Behavior of Sport O2O Service in Korea and China: Applying Value-based Adoption Model (VAM), *The Korean Journal of Physical Education*, 2022, Vol. 61, No. 6, pp. 1-17.

[26] Lee, R.S. and Cho, M.H., The Roles of Information Value, Information Sense, and Prior Knowledge in Relation to the Type of Restaurant Smart Phone Application Contents, *The Tourism Sciences Society of Korea*, 2016, Vol. 40, No. 7, pp. 31-53.

[27] Lee, S.Y., Kim, I.H., and Jang, J.H., A Study on the Relationship between Health Concern and Purchase Behavior of the Environmental Friendly Agricultural Products, *The Korean Association For Local Government & Administration Studies*, 2011, Vol. 25, No. 1, pp. 77-100.

[28] Lin, T.C., Wu, S., Hsu, J.S.C., and Chou, Y.C., The integration of value-based adoption and expectation−confirmation models: An example of IPTV continuance intention, *Decision Support Systems*, 2012, Vol. 54, No. 1, pp. 63-75.

[29] Mathieson, K., Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior, *Information Systems Research*, 1991, Vol. 2, pp. 173-191.

[30] Midgley, D.F. and Dowling, G.R., Innovativeness: The Concept and Its Measurement, *Journal of Consumer Research*, 1978, Vol. 4, No. 4, pp. 229-242.

[31] Park, H.J., A Study on Effects of LCC Prior knowledge

and Selection Attributes on Behavioral Intention of University Students, *Korea Tourism Research Association*, 2020, Vol. 24, No. 1, pp. 75-98.

[32] Park, I.S. and Jung, I.Y.Z., A Study on Factors Influencing Consumer Purchase Intentions and Purposes in Direct-To-Consumer Genetic Test, *Journal of Digital Convergence*, 2019, Vol. 17, No. 7, pp. 167-177.

[33] Park, S. and Kim. C.J., Incorporating the Ethical Concerns of Direct-To-Consumer Genetic Testing in Employee Education, *Korean Journal of Medical Ethics*, 2022, Vol. 25, No. 1, pp. 21-41.

[34] Rice, R.E. and Aydin, C., Attitudes toward New Organizational Technology: Network Proximity as a Mechanism for Social Information Processing, *Administrative Science Quarterly*, 1991, Vol. 36, No. 2, p. 219.

[35] Rogers, E.M., *Diffusion of innovations*, fifth ed., New York: Free Press, 2003.

[36] Ryoo, S., Kim, H., and Jeon, S., An Empirical Study on Mobile Web Browsing Service Adoption in Korea, *Eighth International Conference on Mobile Business*, 2009, p. 324.

[37] Shin, S.W. and Shin, G.C., A Study on the Effect of Enhancer and Inhibitor on the Resistance and Use Intention of Online Used Trading Platform: Focusing on the Dual Factory Theory, *Information Systems Review*, 2022, Vol. 24, No. 1, pp. 125-155.

[38] Stewart, K.F.J., Wesselius, A., Schreurs, M.A.C., Schols, A.M.W.J., and Zeegers, M.P., Behavioural changes, sharing behaviour and psychological responses after receiving direct-to-consumer genetic test results: a systematic review and meta-analysis, *Journal of Community Genetics*, 2018, Vol. 9, No. 1, pp. 1-18.

[39] Vasli, P., Shekarian-Asl, Z., Zarmehrparirouy, M., and Hosseini, M., The predictors of COVID-19 preventive health behaviors among adolescents: The role of health belief model and health literacy, *Journal of Public Health*, 2022, Vol. 32, pp. 157-166.

[40] Venkatech, V. and Davis, F.D., A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies, *Management Science*, 2000, Vol. 46, No. 2, pp. 186-204.

[41] Warshaw, P.R., A new model for predicting behavioral intentions: An alternative to Fishbein, *Journal of Marketing Research*, 1980, Vol. 17, No. 2, pp. 153-172.

[42] Yoo, Y.J., Choi, H.Y., and Lee, M.K., Effects of Perceived Risk on Medical Tourists Hesitation: Moderating Effects of Prior Knowledge and Perceived Control, *Landscape and Geography*, 2010, Vol. 20, No. 1, pp. 111-119.

[43] Yun, S.U., A Study on the Acceptance Decision Factor of IPTV, *Journal of Communication Science*, 2009, Vol. 9, No. 1, pp. 162-197.

[44] Yun, S.S. and Jeon, D.H., The effect of consumers' perceived ease and usefulness of using delivery applications on perceived value, satisfaction, and trust: Focusing on the expanded technology acceptance model, *Food Service Industry Journal*, 2022, Vol. 18, No. 3, pp. 257-269.

[45] Zekun, Z., User Acceptance of Mobile Healthcare Applications: An Integrated Model of UTAUT and HBM Theory, *Korean Association for Policy Sciences*, 2015, Vol. 19, No. 3, pp. 203-236.

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