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Study on the Distribution Environmental Characteristics of Unmanned Stores*

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Abstract

Purpose: The first purpose of this study is deriving in-store characteristics that affect the experience of customers using unmanned stores and reveals the value of major services that customers feel and experience. Also, an empirical analysis is conducted on the effect of intelligent consumption value after using unmanned stores on consumption emotions and continuous use intention, and the modulating effect of customers' untact tendency on environmental characteristics and the value of intelligent services is verified. **Research design, data and methodology**: Samples were taken from 186 people who visited the unmanned store from April to June 2022 to investigate the research model. **Results**: It was found that the environmental characteristics of unmanned stores had a positive effect on the intelligent service value. Also, the higher the value of intelligent service, the stronger the influence on consumption emotions, and the higher the value of the intelligence service and consumption emotions, the stronger the impact on the intention to use intention. The untact propensity played a role in controlling the relationship between ease of using technology and the intelligent service value and the relationship between spatial arrangement and functionality and intelligent service value. **Conclusion**: In order to improve unmanned store service in the trend of spreading unmanned stores, it is necessary to not only improve the technology using convenience in terms of store environmental characteristics but also create innovative consumption experiences in terms of space layout, function, and convenience of payment.

Keywords: Unmanned Stores, Environmental Characteristics, Ease of Using Technology, Spatial Layout and Functionality, Convenience of payment, Intelligent Service Value, Consumption Emotion, Continuous Use Intention, Untact Tendency

JEL Classification Code C83, L81, M31, P46

1. Introduction

In the field of the distribution industry, unmanned trends spread by applying ICT, Information and Communication Technologies (ICT) of the 4th Industrial Revolution. Various types of unmanned stores, such as unmanned convenience stores, unmanned cafes, and unmanned laundry, are emerging in a form that is fused with IT technology.

In recent years, the minimum hourly wage and the 52-hour work week have increased dramatically, increasing the employment problem. This is because self-employed people are increasingly interested in unmanned stores as a way to ease the burden of labor cost. Operational advantages that can be obtained through unmanned stores include reducing costs such as labor costs and overcoming business hours limits. On the consumer side, it is a reduction in waiting time for payment or an increase in satisfaction due to a new and convenient shopping experience.

Recently, unmanned trends are spreading throughout the distribution industry. Many large companies are making

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great efforts to provide differentiated customer experiences by actively introducing IT-based technologies to reduce costs and operate efficiently.

Unmanned stores combine the strengths of offline stores with new technologies to provide unique and innovative environmental characteristics. Various high-tech technologies such as artificial intelligence are gathered to provide new types of environmental characteristics. It minimizes procedural inconvenience in the purchase process without facing each other and provides personalized shopping information in a friendly manner. It focuses on improving living value by inducing satisfactory consumption while directly participating from shopping to payment.

Sephora, a global beauty company, is providing environmental characteristics that allow people to test makeup products without actually doing them through augmented reality technology in-store. Recently, Lotte Duty Free is introducing a smart store with digital devices. These stores commonly incorporate digital technology. It is intended to increase the consumption value by strengthening the customer experience factor in the service. These recently introduced technologies are changing customer consumption sentiment (Doorn et al., 2017). Unmanned stores accumulate positive consumption emotions for new shopping experiences by effectively reflecting consumer needs and providing a new environment. Consumers' continuous use of unmanned store services may be expanded (Luo, 2010).

Since COVID-19, interest in the 'Untact' trend has been increasing in the distribution industry. ‘Untact’ service refers to a non-face-to-face service that minimizes face-to-face contact with employees by utilizing digital technology. Recently, the untact trend is drawing attention as a key issue due to COVID-19. With the prolonged COVID-19, 'Untact' is becoming our daily routine.

This study focused on consumer tendencies among the 'Untact' trends. This is to determine whether the value of a consumer's intelligent service varies according to the 'Untact' tendency.

Previous studies focused on the advantages that can be obtained through unmanned stores and the advantages in terms of consumers. However, this study is to examine the current situation of unmanned stores and the direction to proceed from the perspective of users by utilizing the characteristics of various stores through empirical analysis.

To this end, first, based on previous studies, in-store characteristics that affect the experience of customers using unmanned stores are presented. The characteristics of unmanned stores identify the value of major services that customers feel and experience. Second, an empirical analysis is conducted on the effect of intelligent consumption value obtained from unmanned stores on consumption emotions and continuous use intention. Finally, it verifies the modulating role of customers' untact tendencies on the environmental characteristics of unmanned stores and the intelligent service value.

2. Theoretical Background

2.1. Environmental Characteristics of Unmanned Stores

An unmanned store is a store that sells goods without a salesperson. It is a technology-based store that allows companies to provide services more smoothly and reduce labor in an environment where many service companies occur. It is any technical means of access that allows users to produce or use services directly rather than interacting with employees who provide them (Kathleen et al., 2007).

Most of the preceding studies on the characteristics of unmanned stores have been conducted focusing on non-face-to-face services such as bank automation devices and vending machines. Recently, the scope of technology has been expanding due to the rapid development of IT and technology. Accordingly, studies on unmanned stores where customers directly perform services are being conducted. The environmental characteristics of the store are very important because unmanned stores must replace what employees do.

Dabholkar and Bagoozi (2002) suggested ease of use as a determinant of technology-based self-service. Rai et al. (2002) stated that the ease of use of technology-based self-service has a significant effect on consumers' attitudes and satisfaction related to the use of new technologies. Environmental psychology explained that the physical environment has a significant influence on consumer behavior as consumers perceive and respond to environmental stimuli inside the store (Wu & Liang, 2009). Pareigis et al. (2011) called the internal environment of the store a combination of physical elements. Convenience has been verified to be significantly related to customer satisfaction, perceived latency, value, perceived congestion, loyalty, revisit intention, and transition behavior (Collier & Sherrell, 2010; Wang, 2015). Meuter et al. (2000) said that the convenience of time and place (effort) determines customer satisfaction. Rust et al. (2004), which considered the importance of customer assets in marketing strategies, revealed a strong relationship between convenience and value.

In this study, based on previous studies, the environmental characteristics of unmanned stores were set as characteristics of unmanned stores, such as ease of technology use, spatial arrangement and function, and payment convenience.

2.2. Environmental Characteristics and Intelligent Service Value

Unmanned stores are high-tech intensive services such as artificial intelligence, big data, sensor network, and bio-recognition technology. Recently, high-tech technologies are undergoing commercialization stages in terms of product services, focusing on intelligent services such as smart speakers, artificial intelligence robots, and autonomous vehicles. Intelligent services that commercialize various high-tech technologies are gradually increasing their market share and showing growth. Positive expectations for high-tech services will be formed for consumers who have experienced the effect. In fact, in the case of the smart speaker market, an average annual growth rate of 35% is predicted by 2024.

In unmanned stores, customers do not simply receive services, but play the role of producers who produce services on their own. Therefore, customers consider the benefits they receive in contrast to their efforts and recognize the value (Venkatesh & Davis, 2008). It is necessary to recognize the usefulness of consumers and reduce perceived risk of innovation services by satisfying the expected value of intelligent smart services provided in unmanned stores, such as comfort, intelligent problem solving, rapid customized information provision, and unexpected convenience. Service quality is linked to customer satisfaction and repurchase intention by affecting perceived service value (Eleonora & Loredana, 2012).

As can be seen from previous studies, the unmanned store service specificity, which can be said to be more innovative than any other service in the current situation, is very likely to affect the perceived usefulness of intelligent services. Therefore, among the environmental characteristics of unmanned stores, the hypothesis to verify the relationship between technology ease of use, spatial layout and functionality, and payment convenience with perceived intelligent service value is established as follows.

H1-1: The ease of using technology in unmanned stores will have a positive effect on the intelligent service value.
H1-2: The spatial layout and functionality of unmanned stores will have a positive effect on the intelligent service value.
H1-3: The convenience of payment unmanned stores will have a positive effect on the intelligent service value.

2.3. Intelligent Service Value and Consumption Emotion

Consumption emotion is a combination of basic emotions caused by good or bad experiences with a product. This provides an emotional feeling of consumer response to consumption outcomes (Oliver, 1999). Consumption emotion is knowledge of the pleasant emotional value of a product. It is the consumer's knowledge expressed by the consumer's familiarity with products and services (Chaudhuri & Holbrook, 2001). As a result of reviewing previous studies, the hypothesis was established that the degree of consumption emotion would play an important role in consumer value, store environment characteristics, and relationship quality.

H2: The higher the intelligent Service Value, the stronger the impact on consumption emotion.

2.4. Intelligent Service Value and Continuous Use Intention

Woodruff and Gardial (1996) said that service value is what customers expect from products or services, and customer satisfaction is past-oriented and service value is future-oriented. Parasuraman and Grewal (2000) argued that perceived value affects not only the customer's choice behavior before purchase, but also satisfaction after purchase, repurchase intention, and recommendation intention. The higher a customer perceives value for a good or service, the higher the customer's satisfaction or intention to use it (Cronin et al., 2000; Sweeney & Soutar, 2001). The perceived value of the user to the service is determined by four types of values: emotional value, social value, monetary value, and performance/quality value. Perceived value consequently affects the increase in satisfaction and intention to pay. Magana (2019) verified that consumption value affects continuous use intention and that service value can increase service satisfaction.

As shown in such previous studies, the hypothesis of H3 has been established between intelligent service value and continuous use intention.

H3: The higher the intelligent service value, the greater the impact on continuous use intention.

2.5. Consumption Emotion and Continuous Use Intention

Customers are more successful in continuing to use the selected information than in selecting and using it for the first time (Bhattacherjee, 2001). Customer satisfaction is an emotion that occurs after experiencing the product and service provided. It occurs when you realize that you have been provided with something that meets or exceeds the customer's satisfaction criteria. Therefore, the recognition of positive emotions and memories for a product or service received by a customer is the basis for a continuous relationship between the service provider and the customer,

resulting in a significant relationship with consumer behavior after purchase (Grewal et al., 2003). Kabadayı et al. (2012) stated that in a study on the effect of technology orientation of home appliance retailers on emotion and continuous use, emotion has a significant effect on continuous use. Rashid (2013) demonstrated the effect of visiting experience on emotion and behavioral intention. Visiting experience has a significant effect on emotions, and emotions have a positive effect on behavioral intention. As such a previous study, hypothesis H4 was established that there is a significant relationship between consumption emotion and continuous use intention.

H4: The higher the consumer emotion, the higher the continuous use intention.

2.6. The Modulating Effect of Untact Tendency

Due to COVID-19, interest in untact trends is also growing in the distribution industry. Recently, in the distribution industry, untact tendency that prefer non-face-to-face contact through high-tech IT devices rather than contact between people are spreading to all ages. In particular, sales in the past two years have increased by about 500% from those in their 40s and older. In the early days, the MZ generation led the untact service, and now more than 40s, who are economically affordable, have appeared in the market. In other words, untact services consumption is spreading to all ages. This can be seen that if the existing untact culture has grown around the MZ generation with a strong personal tendency, the untact culture is spreading throughout the entire generation due to COVID-19.

In this study, the modulating effect of untact propensity between unmanned store environmental characteristics and intelligent service value was analyzed. Untact tendencies are preferred for non-face-to-face contact, and shopping alone is convenient. It was redefined as a tendency to feel more comfortable when shopping alone than human contact. Therefore, the following hypothesis was established.

3. Research Methodology

3.1. Research Model and Samples

The aim of this study is to uncover the effect of sub-variables of technology ease of use, spatial layout and function, and payment convenience, which are environmental characteristics of unmanned stores, on the value of intelligent services. In addition, we examine the effect of intelligent service value on consumption emotion and continuous use intention, and the relationship between consumption emotion and continuous use intention. Finally, it was intended to investigate the mediating effect of untact propensity in the relationship between the environmental characteristics of unmanned stores and the value of intelligent services. For the purpose of such research, the research model was established as shown in Figure 1.

Considering that unmanned stores are a service that has not yet been generalized, the survey process first confirmed whether they are aware of unmanned stores. Questionnaires were distributed only to respondents who said they knew or had experience in using them. A total of 186 copies of the questionnaire were used.

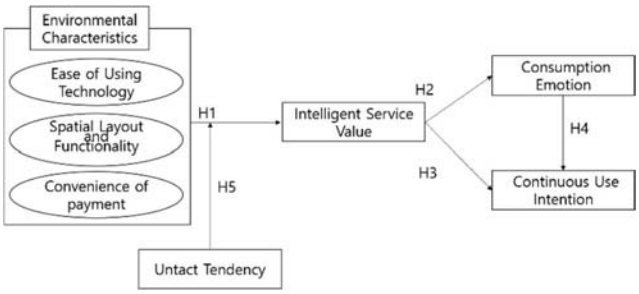

Figure1: Research Model

3.2. Measurement of Variable

Prior to conducting this research survey, the survey items were defined operatively and then the survey items were reorganized according to the study.

Table 1: Variable Definition

Factors		Definitions of Manipulative Variables	References
Environ-mental Characteristics	Ease of Using Technology	Degree of belief that the use of unmanned stores will require less effort by consumers	DeLone and Mclean (2003) Seddon (1997)
	Spatial Layout and Functionality	Store layout, equipment, and space functions	Bitner et al. (2000) Grewal et al. (2003)
	Convenience of payment	The degree to which the self-checkout counter can be used conveniently	Seiders et al. (2005), Collier & Sherrel (2010)
Intelligent Service Value		Intelligent problem solving, speed and convenience in shopping—the expected value of intelligent smart services	Magana (2019)
Consumption Emotion		The level of positive emotions that customers feel	Hwang and Lee (2019)
Continuous Use Intention		The degree to which you want to use it continuously	Sung and Jeon (2020)
Untact Tendency		Preference for non-face-to-face contact and the tendency to feel comfortable when shopping alone	Lee and Lee (2020)

4. Results

4.1. Empirical Analysis Result

186 questionnaires were used for empirical analysis of the study. Table 2 shows the results of the respondents' demographic characteristics.

Table 2: Demographic Characteristics of the Respondents

Classification		Frequency (person)	Percentage (%)	Classification		Frequency (person)	Percentage (%)
Gender	male	89	47.8	Occupation	sales/service	48	25.8
	female	97	52.2		office job	60	32.3
Age	21 ~ 30 years	74	39.8		professional	23	12.4
	31 ~ 40 years	58	31,2		self-employment	17	9.1
	41 ~ 50 years	33	17.7		housewife	10	5.4
	over 50 years	21	11.3		students	27	14.5
					Etc.	1	0.5
Academic Background	Graduate of college	9	4.8	Use store per week	over 1time	92	49.5
	Graduate school	119	64.0		over 3times	58	31.2
	Graduate school graduation	58	31.2		over 5times	34	18.3
					over 7times	2	1.1

This study evaluated the composition validity of the measurement tool through intensive validity discrimination validity law validity, and evaluated the internal consistency based on the Cronbach's α coefficient to determine whether the growth support of the measurement tool was secured. The results of confirmatory factor analysis are shown in <Table 3>. For the fit of the measurement model, the value χ^2 is 751.019 (df=.329, p=.000) showed nonconformity, but it was diagnosed that the suitability was considered along with the absolute suitability index and the simplified suitability index because it was sensitive to the sample size and the number of observed variables. As a result of the fit of the model, the GFI and AGFI values were found to be below the reference value, but overall, they were judged to be acceptable models as they showed above the reference value (χ^2/df=2.283, RMR=.059, GFI=.875, AGFI=.830, NFI=.930, TLI=.935, CFI=.963, RMSEA=.059). In addition, the standardized factor load value of all measurement items was 0.5 or more, and it was found that the AVE and concept reliability (CCR), which are the intensive validity evaluation methods proposed by Fornell and Larker (1981), both met the criteria of AVE>0.5 and CCR>0.7. The measurement items of this study were judged to have sufficient concentrated validity. The Cronbach's α coefficient of all constituent concepts was very high at 0.9 or higher.

Table 3: Verification Factor Analysis

Measurement		Standardization factor loading value	Std. error	C. R.	p	AVE (CCR)	Cronbach's α
Ease of Using Technology	Ease of Using Technology1	.890	-	-	-	.709 (.906)	.857
	Ease of Using Technology2	.843	.072	15.906	***		
	Ease of Using Technology3	.932	.064	17.229	***		
	Ease of Using Technology4	.681	.083	10.512	***		
Spatial Layout and Functionality	Spatial Layout and Functionality1	.787	-	-	-	.629 (.894)	.846
	Spatial Layout and Functionality2	.762	.106	10.649	***		
	Spatial Layout and Functionality3	.682	.106	9.123	***		
	Spatial Layout and Functionality4	.846	.112	9.239	***		
	Spatial Layout and Functionality5	.873	.113	5.539	***		

Measurement		Standardization factor loading value	Std. error	C. R.	p	AVE (CCR)	Cronbach's α
Convenience of payment	Convenience of payment1	.708	-	-	-	.639 (.875)	.822
	Convenience of payment2	.795	.071	15.824	***		
	Convenience of payment3	.786	.098	11.313	***		
	Convenience of payment4	.897	.072	13.26	***		
Intelligent Service Value	Intelligent Service Value1	.946	-	-	-	.606 (.857)	.765
	Intelligent Service Value2	.814	.086	14.585	***		
	Intelligent Service Value3	.690	.089	15.772	***		
	Intelligent Service Value4	.625	.075	12.71	***		
Consumption Emotion	Consumption Emotion1	.871	-	-	-	.815 (.946)	.884
	Consumption Emotion2	.926	.051	18.932	***		
	Consumption Emotion3	.944	.05	19.809	***		
	Consumption Emotion4	.868	.051	16.498	***		
Continuous Use Intention	Continuous Use Intention1	.936	-	-	-	.864 (.962)	.899
	Continuous Use Intention2	.948	.036	26.363	***		
	Continuous Use Intention3	.898	.048	21.591	***		
	Continuous Use Intention4	.935	.039	24.947	***		
Untact Tendency	Untact Tendency1	.848	-	-	-	.656 (.851)	.766
	Untact Tendency2	.804	.075	11.693	***		
	Untact Tendency3	.776	.089	11.275	***		
χ^2=751.019(df=329, p=.000), χ^2/df=2.283, RMR=.059, GFI=875, AGFI=.830, NFI=.930, TLI=.935, CFI=.94, RMSEA=.059							

***: p<.001

Finally, the relationship between all potential variables is below the absolute value of 0.7 as shown in Table 3. Therefore, it was judged that the validity of the discrimination between the concepts of each composition was established. It was also evaluated that the directionality of the relationship between each compositional concept appeared as a positive relationship consistent with the hypothesis direction established in this study, resulting in the establishment of law validity. Consequently, the compositional validity of the measurement tools of this study was sufficient.

Table 4: Verification of Discriminant Feasibility and Legal Feasibility

	Ease of Using Technology	Spatial Layout and Functionality	Convenience of payment	Intelligent Service Value	Consumption Emotion	Continuous Use Intention	Untact Tendency
Ease of Using Technology	.709[a]	.208[b]	.372[b]	.223[b]	.179[b]	.225[b]	.095[b]
Spatial Layout and Functionality	.456	.629[a]	.204[b]	.128[b]	.265[b]	.210[b]	.228[b]
Convenience of payment	.610	.452	.639[a]	.128[b]	.226[b]	.321[b]	.181[b]
Intelligent Service Value	.472	.358	.358	.606[a]	.237[b]	.156[b]	.072[b]
Consumption Emotion	.423	.515	.475	.487	.815[a]	.263[b]	.178[b]
Continuous Use Intention	.474	.458	.567	.395	.513	.864[a]	.147[b]
Untact Tendency	.308	.477	.425	.268	.422	.384	.656[a]

a: AVE, b: R^2

4.2. Hypothesis Verification

The results of analyzing the structural equation model for hypothesis verification of this study are shown in <Tale 5>. For the fitness of this study, the χ^2value is 721.019 (df=266, p=.000) as in the confirmatory factor analysis in the case of fitness.000) showed inadequacy, as in confirmatory factor analysis. The suitability of considering the absolute suitability index and the simplified suitability index was diagnosed because the suitability could not be determined only by its significance. Although the values of GFI, AGFI, and NFI were found to be below the standard, it was generally judged to be an acceptable model by showing an abnormality in the standard value(χ^2 /df=2.711, RMR=.047, GFI=.879, AGFI=.831, NFI=.932, TLI=.935, CFI=.965, RMSEA=.061).

On the other hand, the explanatory power for the value of intelligent services by exogenous variable 1 (easy of using technology, spatial layout and functionality, convenience of payment) was very high at 81.1%. The explanatory power of consumption emotion by exogenous variable 2 (intelligent service value) was 51.2%, and the explanatory power of continuous use intention by exogenous variable 3 (intelligent service value, consumption emotion) was 63.2%, showing generally high explanatory power.

4.2.1. Environmental Characteristics and Intelligent Service Value

H1 is the verification result of the effect on the ease of using technology, spatial layout and functionality, and convenience of payment on the intelligent service value, which are sub-factors of environmental characteristics of unmanned stores. H1-1, the standardized path coefficient of the ease of using technology on the intelligent service value is .393., t=2.553(p<.05). It was found to have a positive (+) effect as 0 effect. Therefore, H1-1 was adopted.

H1-2, the standardized path coefficient for the effect of spatial arrangement and functionality on the intelligent service value was found to be .412, t=4.169 (p<.001). As a result of empirical analysis, it was found that it had a positive (+) effect. Therefore, H1-2 was adopted.

H1-3, the standardized path coefficient for the effect of convenience of payment on the intelligent service value was found to be .525., t=5.506(p<.001). It was found to have a positive effect. Therefore, H1-3 was adopted.

4.2.2. Intelligent Service Value and Consumption Emotion

H2, the standardized path coefficient for the effect of intelligent service value on consumption emotion turned out to be 744. Also, t=8.205(p<.001). It was found to have a positive effect. Therefore, H2 was adopted.

4.2.3. Intelligent Service Value and Continuous Use Intention

H3 is the verification result of the effect of intelligent service value on continuous use intention. The standardized path coefficient was .681, and t=7.044 (p<.001), indicating a positive (+) effect. Therefore, H3 was adopted.

4.2.4. Consumption Emotion and Continuous Use Intention

H4 is the verification result of the effect of consumption emotion on continuous use intention. The standardized path coefficient was found to be 0.310, and t=3.169 (p<.001), which was found to have a positive (+) effect. Therefore, H4 was adopted.

Table 5: Structural Equation Model Analysis Results

Path				Std.factor	Std.error	t-value	p-value	SMC[a]
H1	Ease of Using Technology	→	Intelligent Service Value	.393	.236	2.553	.011	.419
	Spatial Layout and Functionality			.412	.191	4.169	***	
	Convenience of payment			.525	.255	5.506	***	
H2	Intelligent Service Value	→	Consumption Emotion	.744	.079	8.205	***	.512
H3	Intelligent Service Value	→	Continuous Use Intention	.681	.098	7.044	***	.632
H4	Consumption Emotion			.310	.078	3.169	.002	
χ^2= 721.019(df=266, p=.000), χ^2/df=2.711, RMR=.047, GFI=.879, AGFI=.831, NFI=.932, TLI=.935, CFI=.965, RMSEA=.061								

*** p<.001, a: Squared Multiple Correlations

4.2.5. The Modulating Effect of Untact Tendency

In order to verify the moderating effect of the untact propensity of H5, it was divided into a group with a high untact propensity (high group) and a low group (low group) based on the average value of the untact propensity. The amount of change in values according to the change in freedom between the constrained model and the non-constrained model for each path was compared. <Table 6> shows the results of comparing the path coefficients of potential factors between groups of untact tendencies.

H5-1 is the effect of ease of using technology on the intelligent service value among the sub-factors of environmental characteristics of unmanned characteristics. The path coefficient of the group with high untact propensity was shown as .204, C.R=4.466 (p=.015). For the high group, it was found that the ease of using technology had a positive (+) effect on the intelligent service value. In addition, the path coefficient of the untact propensity low group was .111 and C.R=1.232 (p=.218). For the low group, it was found that the ease of using technology did not affect the intelligent service value. The difference in value between the model and the non-constrained model that constrains the relationship between ease of using technology and intelligent service value is 5.187. It was found that there was a significant difference between the untact propensity groups. Therefore, H5-1 was adopted.

H5-2 is the effect of spatial arrangement and functionality on the intelligent service value among the sub-factors of environmental characteristics of unmanned characteristics. The path coefficient of the group with high untact propensity is .303, C.R=2.855(p=.004). In the high group, spatial layout and functionality were found to have a positive (+) effect on the intelligent service value. In addition, the path coefficient of the group with a low untact tendency was .180, and C.R=3.277 (p=.001). For the low group, spatial layout and functionality were found to have an effect on the intelligent service value. On the other hand, the difference in χ^2 value between the model and the non-constrained model that constrains the relationship between spatial layout with functionality and intelligent service value is 3.921. The degree of freedom was higher than the χ^2 threshold of 3.84, for the change of 1. It was found that there was a significant difference in untact propensity between groups. Therefore, H5-2 was adopted.

H5-3 is the effect of payment convenience on the intelligent service value among the sub-factors of environmental characteristics of unmanned characteristics. The path coefficient of the group with high untact propensity is .623, C.R=9.036(p=.000). For the high group, convenience of payment was found to have a positive effect on the intelligent service value. Also, the path coefficient of the untact propensity low group is .374, C.R=4.730(p=.000). For the low group, convenience of payment was found to have an effect on the intelligent service value. On the other hand, the difference in χ^2 value between the model and the non-constrained model that constrains the relationship between convenience of payment and intelligent service value is 3.008. The degree of freedom was lower than the χ^2 threshold of 3.84, for the change of 1. It was found that there was no significant difference in untact propensity between groups. Therefore, H5-3 was rejected.

Table 6: Analysis of Untact tendency Modulating Effect

Path				Non-Std. factor	Std. error	t-value	p-value	$\Delta\chi^2$ (df)
Untact Tendency (H)	Ease of Using Technology	→	Intelligent Service Value	.204	.046	4.466	.015	5.187(1) > 3.84
Untact Tendency (L)				.111	.090	1.232	.218	
Untact Tendency (H)	Spatial Layout and Functionality			.303	.106	2.855	.004	3.921(1) < 3.84
Untact Tendency (L)				.180	.055	3.277	.001	
Untact Tendency (H)	Convenience of payment	→		.623	.069	9.036	***	3.008(1) > 3.84
Untact Tendency (L)				.374	.079	4.730	***	

***:p<.001

5. Conclusion

5.1. Research Implications

The main purpose of this study is to verify the relationship between the environmental characteristics of unmanned stores, intelligent service value, consumption emotion, and continuous use intention, and to confirm the modulating effect of untact propensity in the relationship between variables. Through this empirical analysis, it is to propose a service improvement plan to stabilize unmanned store services in the commercialization stage. The hypothesis test results and theoretical implications of this study are as follows.

Hypothesis 1, the hypothesis that 'the environmental characteristics of unmanned stores will have a positive effect on service value' was partially adopted. It was found that technology ease of use, spatial arrangement and function, and

convenience of payment, which are sub-variables, had a positive effect on the intelligent service value. As a result of this, previous studies have shown that the physical environment has a positive (+) effect on service value. It is consistent with the results of previous research (Eleonora & Loredana, 2012; Han & Ryu, 2009).

Hypothesis 2, the hypothesis that 'the higher the intelligent service value, the stronger the impact on consumption emotions' was adopted. This result is consistent with the results of previous studies (Korai & Souiden, 2017) that the higher the customer value, the higher the positive customer emotion.

Hypothesis 3, the hypothesis that the higher the intelligence service value, the stronger the impact on continuous use intention will be adopted. This is consistent with the results of the study that the higher the customer perceives value, the higher the continuous use intention (Cronin et al., 2000; Sweeney & Soutar, 2001).

Hypothesis 4, 'The higher the consumption emotions, the higher the continuous use intention.' has been adopted. This result supports the results of previous studies that consumer sentiment has a particular effect on customer behavior (Gardner, 1985).

Hypothesis 5 was partially adopted that 'untact propensity will play a modulating role in the relationship between the environmental characteristics of unmanned stores and the intelligent service value'. The untact propensity played a role in controlling the relationship between ease of using technology and the intelligent service value and the relationship between spatial arrangement and functionality and intelligent service value. However, it was found that it did not play a modulating role in the relationship between convenience of payment and intelligent service value. Consumers with high untact tendencies prefer non-face-to-face contact rather than contact between people, and feel convenient to shop alone without interference from others when shopping (Lee &Lee, 2020). As a result of the research analysis, untact customers tend not to prefer to contact others, so when purchasing goods, they tend to use stores around their residence without moving far away. It was found that the convenience of payment in unmanned stores did not affect the creation of positive consumption value.

The following are the theoretical implications of this study. First, the subject of research on store environmental characteristics has been expanded to unmanned stores. Studies on the physical environment of existing unmanned stores have been studied in terms of companies, but in this study, it was differentiated from existing studies by targeting customers who entered the market from the perspective of consumers. Second, the relationship between the environmental characteristics of unmanned stores, intelligent service value, consumption emotion, and continuous use intention was presented. In addition, the influence relationship between the environmental characteristics and service value of unmanned stores was analyzed in depth using the controlling variable of untact propensity.

The following are the practical implications.

First, in order to improve unmanned store service in the trend of spreading unmanned stores, it is necessary to not only improve the technology using convenience in terms of store environmental characteristics but also create innovative consumption experiences in terms of space layout, function, and convenience of payment. In order to innovate unmanned store services, it is necessary to focus on creating innovative and user-friendly, such as providing familiar intelligent personalized services or intelligent smart services that enable breakthrough reduction in cost-time efforts rather than simply automating the service level. Consequently, it is necessary to implement an integrated communication system that integrates unmanned store spaces and consumers by combining advanced ICT technologies such as artificial intelligence, big data, face recognition, and hand-pay through process redesign across services rather than procedural automation to replace human services.

Second, it has been confirmed that consumers' expectations for intelligent services in unmanned stores are already formed to a considerable level even though they are in the early stages of commercialization. This means that the introduction of various intelligent smart services related to unmanned stores can be an important prerequisite for securing market leadership in the unmanned store industry.

Third, high-tech facilities should be introduced to ensure that the process of customers entering the store, shopping, and leaving is quick and error-free. Non-emotional and continuous use intention should also be operated to satisfy the desire. To prevent customers from feeling uncomfortable shopping, the store layout is designed in consideration of the location of the display and customer movement. An atmosphere is created so that the environment such as illumination and music of the store can be comfortable for shopping so that the customer experience in spatial arrangement and functionality can be met. In addition, it is necessary to have a strategy to open a new store by securing as much advantages as possible for accessibility as products that customers mainly purchase. As described above, it is necessary to plan and establish strategies such as the location, display, and system of the store as a strategy that allows customers to feel the experiential pleasure and satisfaction of visiting the store.

Fourth, customers with untact tendencies are affected by the ease of use of technology and the functionality of spatial layout in unmanned stores. As a result of this, customers with an untact tendency recognize that the element of ‘convenience of payment’ is a part that should be provided when using an unmanned store. It was found that customers with untact tendencies do not affect the level of customer

value for services that are taken for granted. However, it was found that the convenience of payment did not affect the value felt when customers with high untact tendencies used the store. In order to open unmanned stores in the future, it will be necessary to have an access authentication system, an intelligent CCTV, and an unmanned security system, focusing on the ease of use of technology, spatial arrangement, and functionality.

5.2. Limitations

This study has the following follow-up studies and limitations, so I would like to suggest the following for subsequent studies. First, this study conducted a study on customers who use unmanned stores, but various types of unmanned stores are increasing in the recent market environment that is rapidly diversifying. In fact, in conducting the study, there were many respondents who did not recognize the scope of unmanned stores. Therefore, it is necessary to clearly present the concept of unmanned stores in more detail or conduct research in a wider area.

Second, despite the above several meaningful conclusions, this study needs to pay attention to the generalization of the research results as an early stage of commercialization of unmanned stores. In future research related to unmanned stores, it is expected to be a more meaningful study if more diverse and practical variables are considered.

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