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# The Effect of Motivated Consumer Innovativeness on Perceived Value and Intention to Use for Senior Customers at AI Food Service Store\*

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## Abstract

**Purpose:** This study investigates the use intention of artificial intelligence (AI) food service stores for senior customers, which are becoming a trend in the service industry. **Research design, data and methodology:** For the study, the extended technology acceptance model (TAM) and motivated consumer innovativeness (MCI) variables, proven by existing researchers, were used. In addition to the effect of motivated consumer innovativeness on customer value, we investigated the effect of customer value on trust and use intention. For the study, 520 questionnaires were distributed online by an expert survey agency. Data was verified through validity and reliability. **Results:** The analysis results of the research hypothesis verified that functionally motivated consumer innovativeness (fMCI), hedonically motivated consumer innovativeness (hMCI), and socially motivated consumer innovativeness (sMCI) all had positive effects on usefulness and enjoyment. Furthermore, usefulness had a statistically significant positive effect on trust, but perceived enjoyment did not; trust was found to positively affect the intention to use. **Conclusions:** We compared the moderating effects of seniors' gender and age (at 60) between groups. Although there was no moderating effect of age, it was verified that regarding the effect of usefulness on trust, the male group showed a greater influence than the female group.

**Keywords :** AI Food Service Store, MCIs, Perceived Usefulness, Perceived Enjoyment, Trust

**JEL Classification Code:** D12, L81, M19

## 1. Introduction

A large Korean company has finally introduced a famous noodle franchise brand 'Subbot' into the store. Recently, when customer orders food using the application, the delivery arrives at the building and send it to the lobby floor, and the other robot move with the food to the customer on specific floor. This service can save effort for food service store staff and customers.

In India, after successful robot-serviced retail store, another food service stores opened in other places. In Boston, when you go to "SPICE," a food service retailer that sells salads, a robot greets you first. Graduates of the Massachusetts Institute of Technology (MIT) started a robotic food service store, which consists of seven machines. If customer orders, the machines cook, which takes just a few minutes for this robot to cook. Therefore, labor costs were reduced and price competitiveness increased. This food service store is especially popular with customers during lunch breaks. In the future, robot chefs are expected to take the place of most humans. It is expected that AI robots will

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replace various jobs in the retail store, restaurant, café and food service industry.

AI technology is becoming more and more specialized and individualized, and is being applied in food service and retail areas, and in almost all areas (Ali et al., 2018).

The use of newly released AI products can't be easy and even more difficult for seniors (Grover, Kar, & Davies, 2018). TAM is the most popular model for accepting technology (Technology Acceptance Model), and investigators believe its social impact (Ahmad & Khalid, 2017), motivation (Huang, Liu, & Changa, 2012) and technology complexity (Zhaoa, Ni, & Zhou, 2018), technical support (Mäntymäki et al., 2014), and system integration (Gagnon et al., 2016). However, despite a lot of researches, that is true that universal solutions have not been proved.

There have been active studies in terms of technology, but research on consumers' perceived value of AI services, especially AI robot service store for seniors, from the customer side is now in the beginning stage (De Kervenoael, 2020). In particular, research targeting the elderly, which is increasing rapidly, is even more urgent. In developed countries around the world, including Korea, a society with low birth rates and an aging population is rapidly progressing, and the quality of life of the elderly for eating out is taking a very important position (Liu & Grunert, 2020).

Although there are not many studies on eating out in the elderly, studies to date have included some (Kim, Muk, & Yoon, 2019; Andrade et al., 2019; Kobayashi et al., 2017), and studies of technological services by the elderly (Kuo et al., 2016; Lim & Han, 2018; Chen et al., 2011) have been investigated by many preceding researchers. However, there has been no research on the effect of the motivation for innovation in new technologies of seniors who will meet robot serviced retail stores such as food service stores on consumption values and attitudes. Therefore, this study was conducted to understand the motivation and consumption value of seniors when they use AI food service stores which will be very common in the near future in Korea.

The purpose of this study is to investigate how the motivation of senior customers to innovate in AI food service stores affects the consumption value and intention to use the robot when visiting stores such as retail shops and restaurants. In addition, we analyze the moderating effect between groups with gender, age, and education level.

Demographically, Korea is a country that is rapidly moving toward an aging society unprecedented of the world. The future consumers of Korea will be single-person households and senior households. Korea is one of the

most advanced countries in IT (information technology) industry. Currently, the flow of technology is progressing with big data and artificial intelligence. Nowadays, almost all universities are studying artificial intelligence, big data, and coding as major subjects. In the near future, Korea will surely take off as an artificial intelligence powerful nation by inheriting its reputation as an IT powerful nation. When that time comes, it will be common for seniors to meet robots in food service stores.

Therefore, this study intends to provide a clue to help prepare strategic implications for companies that will meet seniors, who are major customers using robot services in the near future, and to broaden the horizons of senior consumer research.

## 2. Literature Review

### 2.1. Perceived Value of AI Food Service Store

de Morais Watanabe et al. (2020) proved in his research that functional and emotional values have a positive effect on consumer trust, and perceived value is an important factor in predicting consumer's trust and purchase intention. When customers use mBanking, various perceived values of customers were found to be an important factor in behavioral intention along with trust factor (Sankaran, & Chakraborty, 2021).

#### 2.1.1. Perceived Usefulness

Perceived usefulness is a dimension of cognitive beliefs that shape user attitudes and determine their intended use, according to TAM (Chuah et al., 2016). Perceived usefulness refers to what customers believe that the service will help them carry out the transaction (Phonthanakitithaworn, Sellitto, & Fong, 2016). In general, it is thought to be advantageous to save time and effort by using technology to complete tasks faster and easier. Therefore, this study proposes that the perceived usefulness of AI food service stores influence on attitudes, which was proven in other studies (Liébana-Cabanillas et al., 2017; Upadhyay & Jahanyan, 2016).

#### 2.1.2. Perceived Enjoyment

Venkatesh, Thong, & Xu (2012) proved perceived enjoyment as the pleasure of using technology. This is the motive using technology based on the perception of entertainment or fun. Perceived enjoyment is a crucial factor for the intention to use a particular system or service (Park et al., 2014).

Existing studies have shown that customers who experience a higher level of enjoyment when adopting the latest technology have been able to reduce perceived risk,

anxiety, and concerns about the use of the new technology. Existing studies have demonstrated the relationship between perceived enjoyment and technology adoption in online shopping and mobile games (Ramayah & Ignatius, 2005).

## 2.2. Effect of MCIs on Perceived Value at AI Food Service Store

The reality is that the average age of the world continues to increase. Since the average age of the elderly population increases with the aging of the population, it is judged that it is necessary to introduce technology for the elderly (Cota, Ishitani, & Vieira, 2015). Kiosk electronics for the elderly in medical facilities were observed (Hasan & Linger, 2016). It has proven that the majority of seniors are motivated by the new features of their kiosk appliances, and feel proud, productive, and pleasure. The extended TAM theory was applied in this research, and the validity of the TAM theory has already been practiced by many researchers. However, we think these studies are not sufficient to cover the technological development. This study expands on the theory of TAM to determine how older customers at retail or restaurants adopt new technologies (Mathieson, Peacock, & Chin, 2001; Hsu & Lu, 2004; Amoako-Gyampah & Salam, 2004). The concept of Motivated Consumer Innovativeness (MCI) can be said to be an extended TAM theory as it has been proven to be motivated and opt-in by newly developed technologies (Hwang, Kim, & Kim, 2019). With the aforementioned MCI model, we tried to measure consumer intention by adding perceived value in detail. Motivation can be said to be various factors that support people to achieve their goals with a sense of purpose (Vandecasteele & Geuens, 2010). The expression 'MCI' is the concept of a consumer innovating from motivation.

With a high level of innovative consumers are more willing to accept innovative technologies or services that have not been previously introduced on the market. Consumer innovation means that when new products or services are launched on the market, they can be easily accessed and bought. Therefore, it can be said that MCI is an internal and external factor that is linked to consumers' innovative consumption behavior by motivation. It has to do with consumer goals (whether business, personal or social). In the end, all customers' purchasing behaviors appear in various forms according to their consumption motives.

Existing researchers have demonstrated that MCI is theoretically accompanied by three sub-dimensions when consumers embrace new technologies (Vandecasteele & Geuens, 2010; Stock, Oliveira, & Hippel, 2015; Reinhardt & Gurtner, 2015). It is divided into hedonistically motivated consumer innovation (hMCI), functionally

motivated consumer innovation (fMCI), and socially motivated consumer innovation (sMCI) (Vandecasteele, & Geuens, 2010). Based on the above existing studies, we would like to propose the following hypothesis.

**H1-1:** Functionally motivated senior customer innovation in AI food service store will have a positive impact on perceived usefulness.

**H1-2:** Functionally motivated senior customer innovation in AI food service store will influence on perceived enjoyment.

**H2-1:** Hedonically motivated senior customer innovation in AI food service store will influence on perceived usefulness.

**H2-2:** Hedonically motivated senior customer innovation in AI food service store will influence on perceived enjoyment.

**H3-1:** Socially motivated senior customer innovation in AI food service store will influence on perceived usefulness.

**H3-2:** Socially motivated senior customer innovation in AI food service store will influence on perceived enjoyment.

## 2.3. Effect of perceived value on trust

Especially in the service industry, it is important for customers to have fun or feel happy when using AI robots. Convenience and usefulness of use and satisfaction with use have a very positive relationship (Haidegger et al., 2013). Perceived usefulness is also very important to the reliability of mobile device users (Amin, Rezaei, & Abolghasemi, 2014). Shen (2019) revealed that when seniors use technology-based products, perceived usefulness plays a very important role in predicting actual technology use (Cha & Seo, 2020).

Customers are more likely to receive the service available from the robot when the robot service is reliable. Robots are not driven by emotions, so they function more honestly than humans. However, some consumers do not trust it due to technical difficulties. Therefore, with the previous studies, the following hypotheses are proposed.

**H4:** Perceived usefulness of AI food service store will have a positive effect on the trust of senior customers.

**H5:** Perceived enjoyment of AI food service store will have a positive effect on the trust of senior customers.

## 2.4. Effect of Trust on Intention to Use

It has been shown that when customers use technological devices such as mobile banking, reliability plays a very significant effect on consumers' intention to use mobile

devices (Chiu, Bool, & Chiu, 2017). In information and communication technology, the concept of trust is closely related to e-commerce or digital payment (Luo et al., 2020; Singh et al., 2020). Many researchers have studied the importance and role of trust in online commerce and purchasing behavior using electronic devices.

Trust is linked to TAM in a variety of ways. The results of previous studies place confidence as a determinant of perceived behavioral intentions (Pavlou, 2003).

Trust directly or indirectly affects the intention to use. Chatbots are a new technology in the market, and trust is an important factor in describing users' attitudes and intentions (Kasilingam, 2020; Cha & Lee, 2020; Cha & Seo, 2019). In his research, Cha (2020) has empirically demonstrated that the reliability of customers visiting AI food service store influence on the intention to use service robots. Therefore, based on the above researches, the following hypothesis is provided.

**H6:** Trust of AI food service store will have a positive effect on intention to use of senior customers.

### 2.5. Moderating Effect of Demographic Factors

Van Deursen, van Dijk, and Peters (2011) confirmed that age, etc., influences the level of Internet technology in order to explain the difference in technology acceptance in the study. In their study, Heo and Lee (2010) found that there is a positive correlation with gender, age, and number of years of participation as factors explaining the life satisfaction of game participants in Michigan seniors.

When hedonistically motivated customer innovativeness in a food service store using serviced-robot affects the attitude of customers to use robot service, a moderating effect has been proved in the age difference (Cha, 2020). Therefore, the following hypothesis is presented.

**H7-1~2:** The impact of perceived value on trust will vary depending on the gender of the senior in AI food service store.

**H8-1~2:** The impact of perceived value on trust will vary depending on the age of the senior in AI food service store.

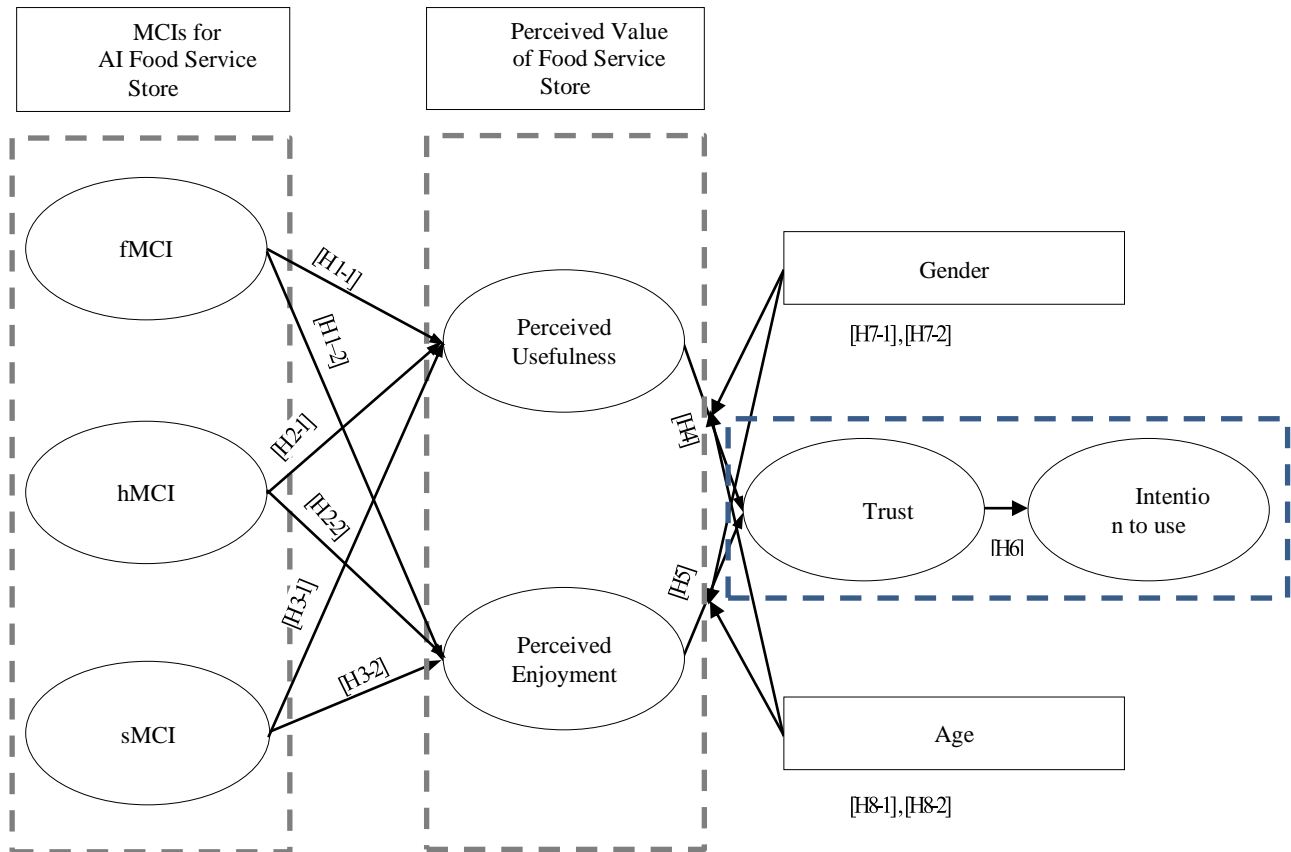


Figure 1: Research model

**Table 1:** Classification for the respondents

Variables	Measure	No. of sample(per)	Percentage (%)	Variables	Measure	No. of sample(per)	Percentage (%)
Gender	Male	296	57.59%	Occupancy	Businessman	266	51.75%
	Female	218	42.41%		Professional	69	13.42%
Age	50's	416	80.93%		Housewife	52	10.12%
	60's	94	18.29%		Own Biz	64	12.45%
	Over 70's	4	0.78%		Retired	24	4.67%
Area	Seoul	305	59.34%	Mics.	39	7.59%	
	Province	209	40.66%	Expenditure per month (10thou.KRW)	< 5	88	17.12%
How often visit per month	≤ 1	168	32.68%		5~10	163	31.71%
	2~3	318	61.87%		11~30	170	33.07%
	> 4	28	5.45%		> 31	93	18.09%

### 3. Research method

A nationwide survey was conducted for seniors in their 50s after completing the questionnaire through a preliminary survey. For the survey, more than 500 questionnaires were distributed through SurveyBilly (<https://www.surveybilly.com/>), a renowned online survey agency in Korea. Seniors to participate in the survey watched and viewed videos (2m 30s) and related snapshots (see Appendix) to help understand the service and operation of AI food service store, and were guided to participate in the survey. Conduct coding and analysis of the surveyed questionnaire to derive implications. The validity and reliability of the model were verified through confirmatory factor analysis and discriminant validity analysis using SPSS and AMOS statistical tools, and the moderation effect analysis between groups was conducted. The demographic status of survey respondents is shown in Table 1 below.

### 4. Empirical result

#### 4.1. Evaluation metrics

First, statistical tools were used to verify validity and reliability, and the AMOS 22 program was used. Then, to verify the explanatory power of the research model, chi-square value, NFI (normed fit index), CFI (comparative fit index), and RMSEA were examined. All indicators prove that the explanatory power of the research model is high. The overall model fit was evaluated as satisfactory as NFI=0.982, CFI=0.994, and RMSEA=0.038. Construct Reliability (CR) and Average Variance Extracted (AVE) meet the criteria (Construct Reliability≥0.6, Average Variance Extracted≥0.5), and both loadings are statistically significant (p <0.01). Convergent validity was confirmed. Table 2 shows the results of confirmatory factor analysis.

**Table 2:** Confirmatory factor analysis

Variables	Item	Standardized Regression coefficient	Concept Reliability	Average Variance Extracted
Functionally Motivated Consumer Innovativeness	fMCI1	.691	.84	.77
	fMCI2	.741		
	fMCI3	.818		
	fMCI4	.770		
Hedonically Motivated Consumer Innovativeness	hMCI1	.764	.87	.72
	hMCI2	.797		
	hMCI3	.802		
	hMCI4	.779		
Socially Motivated Consumer Innovativeness	sMCI1	.685	.89	.75
	sMCI2	.754		
	sMCI4	.799		
Perceived Usefulness	PerU1	.739	.83	.75
	PerU2	.787		
	PerU3	.766		
	PerU4	.688		
Perceived Enjoyment	PerE1	.804	.84	.75
	PerE2	.798		
	PerE3	.661		
	PerE4	.748		
Trust	Trust1	.779	.81	.62
	Trust2	.829		
	Trust3	.872		
	Trust4	.660		
Intention to Use	IntU1	.811	.91	.76
	IntU2	.854		
	IntU3	.860		
	IntU4	.858		

Notes:  $\chi^2 = 835.159$  (df = 303, Chi-square/df = 2.75,  $p < .001$ ), CFI = .941, NFI = .911, TLI = 0.932, IFI = .941, and RMSEA = .049 ( $p < .001$ )

Next, for confirmation of the discriminant validity between factors using the correlation coefficient, the square root of average variance extracted was used to verify the discriminant validity. As shown in Table 3, the value of the square root of average variance extracted was higher than all the correlated values in the relevant row and

column, and the value was analyzed to be greater than 0.7. Therefore, it can be said that the validity of discrimination between the different constituent concepts in which a corresponding difference should appear in their measurement results has been verified.

**Table 3:** Correlation analysis for discriminant validity

	fMCI	hMCI	sMCI	PerU	PerE	Trust	IntU
fMCI	0.756						
hMCI	0.751	0.886					
sMCI	0.753	0.828	0.847				
PerU	0.727	0.827	0.817	0.846			
PerE	0.608	0.850	0.814	0.829	0.855		
Trust	0.670	0.634	0.677	0.710	0.662	0.717	
IntU	0.645	0.719	0.825	0.842	0.729	0.702	0.846

Note) The diagonal value is the square root of AVE

## 4.2. Research hypothesis verification

The test of the hypothesis was analyzed with AMOS 22.0, and the fit indices of the model were chi-square = 1020.151 (df = 312, p = 0.001), IFI = 0.922, TLI = 0.912, CFI = 0.922, NFI = 0.891 and RMSEA = 0.06. All indicators were verified to an appropriate level Table 4 shows the test results of the hypotheses. As a result of the hypothesis test,

it was found that fMCI, hMCI, and sMCI had a statistically significant positive (+) effect on perceived usefulness and perceived pleasure. Moreover, the route coefficient of the perceived usefulness to trust was also significant. However, the influence of perceived enjoyment on trust was not significant. The results of the above verification are shown in table 4.

**Table 4:** Standardized estimates for structural modelling

Hypothesis	Path	Standardized regression coefficient	t-value	Results
H1-1	fMCI → PerU	.245	3.941***	Support
H1-2	fMCI → PerE	-.253	-3.687***	Support
H2-1	hMCI → PerU	-.215	-1.975*	Support
H2-2	hMCI → PerE	.335	3.449***	Support
H3-1	sMCI → PerU	.961	7.796***	Support
H3-2	sMCI → PerE	.800	7.373***	Support
H4	PerU → Trust	.800	9.622***	Support
H5	PerE → Trust	.130	1.807	Reject
H6	Trust → IntU	.886	17.047 ***	Support

In order to examine the moderating effect of gender and age on the perceived value, first of all, the 514 sample was separated into the different groups and the path coefficients were compared. Groups were divided into male, and female. To find out the differences between gender groups, they were divided into two groups, male and female, and between groups by age, two groups were divided between those in their 60s. Table 5 is the result of comparing the moderating effect by dividing the male group and the female group, and the group under 60 years old and the

group over 60 years old. The age group showed no difference in the path of perceived value to trust. On the other hand, the comparison between gender groups was examined in the path of perceived value to trust. When perceived usefulness affects trust, it was found that the male senior group had more influence than the female senior group. As a result, it was found that there was a statistically significant difference. However, there was no difference between male and female groups when perceived enjoyment influenced trust (Cha & Seo, 2019).

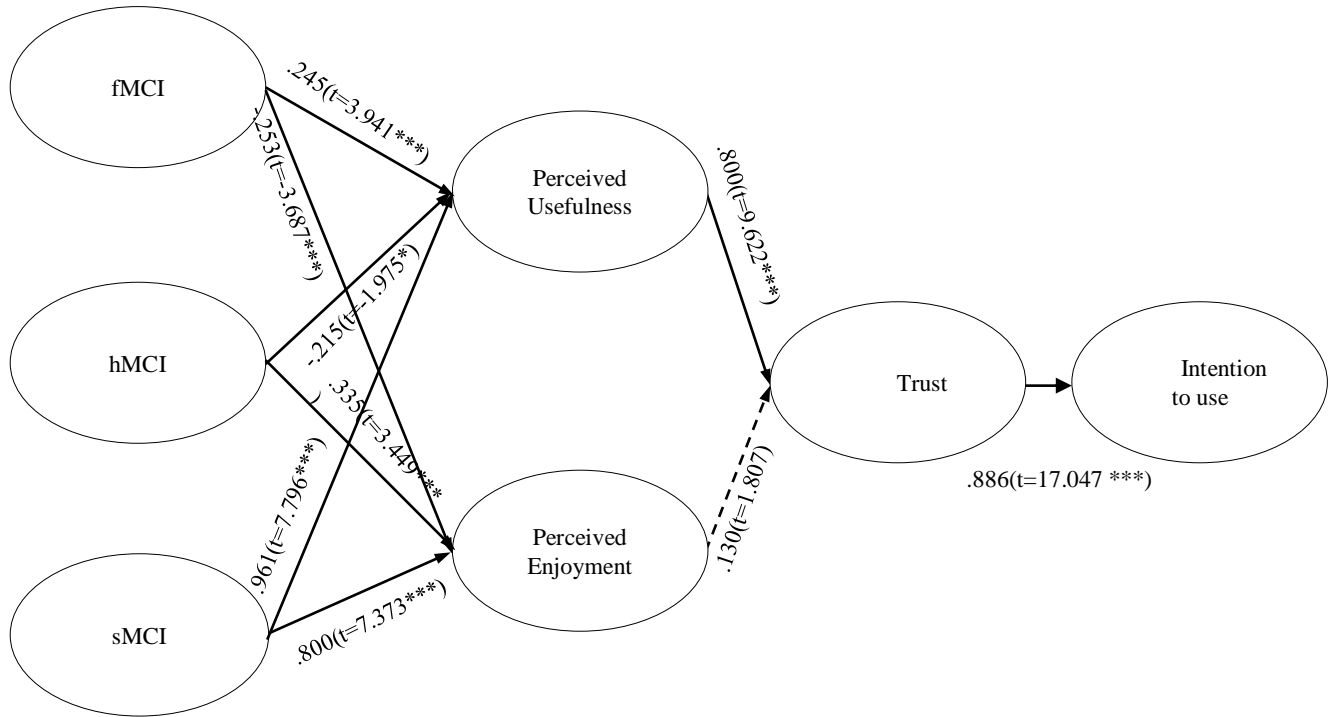


Figure 2: Result of Research model

Table 5: Comparison of age and gender group

	Path	Regression Weight		Results	χ2 increment (df=1)	p value
		50's	Over 60's			
H7-1	PerU → Trust	0.721	0.818	<	0.205	0.651
H7-2	PerE → Trust	0.187	-0.035	>	1.692	0.193
	Path	Regression Weight		Results	χ2 increment (df=1)	p value
		Male	Female			
H8-1	PerU → Trust	1.029	0.591	>	7.160	0.007**
H8-2	PerE → Trust	-0.047	0.239	<	3.443	0.064

### 5. Discussion

First, fMCI had a statistically significant positive effect on perceived usefulness and perceived enjoyment of seniors, suggesting that functionally motivated seniors also value the usefulness and enjoyment of robot services. hMCI also had a statistically significant positive effect on perceived usefulness and perceived enjoyment, indicating that hedonistically motivated seniors also value the usefulness and enjoyment of robot services. Lastly, among MCIs, sMCI was also found to have a significant effect on perceived usefulness and perceived enjoyment of seniors. This means that the social motivation of seniors who use robot services also affects perceived values (usefulness, enjoyment).

Second, in this study, by applying the TAM model, we investigated whether perceived usefulness and perceived enjoyment, which are defined as the perceived value of seniors using robot services, have statistically significant effects on trust of service robots. The effect of perceived usefulness on trust was significant, but the effect of perceived enjoyment on trust was not significant. This means that the value of enjoyment of using robot services in food service stores affects usefulness, but has no relation to trust.

Third, it shows that the trust of service robots in food service stores has a statistically significant effect on the intention to use. Whether the intention of using the service robot is usefulness or pleasure, the trust of the robot service ultimately affects the intention to use the robot service.

## 6. Conclusion and Implications

This study provides important and practical strategic implications for the industry that develops service robots to be operated by food service companies or retail stores that operate robot services. In recent years, the retail and restaurant business has been increasing the labor cost burden not only in Korea but also worldwide due to the increase in the minimum wage. One of the main reasons for the recent closure of Korean retailers is the rise in labor costs (Restaurant Business, 2019). Therefore, AI food service stores are expected to become typical of future stores, and even today, self-service kiosk devices are rapidly deployed in many retail restaurants as a predecessor to AI robot services (Berezina, Ciftci, & Cobanoglu, 2019). In order to survive the fierce competition, retail business companies must use a segmented customer marketing strategy and constantly introduce new and professional menus. In particular, in a super-aged society in the future, the needs of senior customers should be concerned. When aged customers use AI food service store equipped with a new technology, there will be an interest in technology and a fear of unexperienced situations. In particular, adults who are interested in certain aspects of service in stores or restaurants are usually tolerant of new skills and endeavor to learn (Smythe, 2018). However, the reality is that senior generations do not have a strong learning ability to acquire new skills. In the future society, the meeting of robot service personnel and seniors will become an inevitable relationship. It is important to understand the motives and values that are important to them in order to build a system to provide better F&B retail services to an increasing number of older people. Currently, the main customers of the catering industry are young, and the non-face-to-face service is tailored to the young customer base. However, in a future society where the senior customer base occupies a large number of the catering consumption population, the service of catering companies should meet the needs of the senior class. Only companies that understand and apply this trend of the times will not be ignored by future consumers.

The theoretical implications of this study are as follows. Previous researchers have already studied the effects of MCIs on intention to use when using service robots (Cha, 2020; Kwak, Lee, & Cha, 2021). This study is the first and the only study to study the effects of perceived usefulness and perceived enjoyment on trust based on the TAM theory of seniors' MCIs. However, what showed different results from existing researchers is that perceived enjoyment affects trust. In previous studies (Marza, Idris, & Abror, 2019), it has been proven that consumers' perceived

enjoyment has a significant effect on the trust of online shopping use. However, in this study, seniors, not general consumers, were targeted, and it is judged that the different target brought about the different results in the study. It is a meaningful implication of this study that seniors do not significantly affect the trust of perceived enjoyment compared to other generations. This may be evidence that seniors value integrity and practical values more highly than other generations. This is a study on the robot service of seniors who are no longer subject to protect, but will confidently step forward as future consumers. Korea, which is aging at the fastest rate in the world, is famous as an IT powerful nation. Currently, the academic and industrial development of artificial intelligence and data science, such as the development of autonomous vehicles, is rapidly progressing across the nation. If this trend continues, the meeting between senior consumers and food service robots in food service store is inevitable in the near future.

Our study is different and differentiated from existing studies in this respect. As if the future is not far away, the meeting between the senior and the service robot seems to have already come before us, beyond our imagination. Senior customers have different physical and emotional characteristics from other customers, and the cognitive values of robots that exist in the service industry are inevitably different. Therefore, this study tried to empirically analyze these differences and to suggest a basic direction for companies that research robot services in food service stores.

## 7. Limitation and Suggestions

This study empirically studied the intention of using service robots of seniors, who will emerge as future consumers, and drew meaningful implications, but there are also limitations of the study. For perceived value in this study, a TAM model that studied technology acceptance intention was used, but the TAM model cannot explain every consumer behavior. Therefore, it is considered that future studies using the extended TAM model such as UTAUT (Unified theory of acceptance and use of technology) are necessary.

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## Appendix.



Snap Shot retrieved from <https://www.youtube.com/watch?v=EW19h53uqHU>