Senior Consumer Motivations and Perceived Value of Robot Service Restaurants in Korea

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Abstract: This research empirically tested a theoretical model by defining senior customers' intentions to use robot service restaurants emerging in South Korea. Non-face-to-face services have become increasingly important for seniors. Therefore, restaurant marketers should cater to senior customers' needs by sustaining robot service restaurants. The study analyzed 243 questionnaires to verify the reliability and validity of the measurement items. The research hypotheses were examined using structural equation modeling (SEM). The suggested model comprised three stages: motivated consumer innovativeness (MCI), perceived value, and planned behavior (attitude, intention to use). The results revealed that senior customers' perceived values positively influenced attitude and were enhanced by hedonically MCI (hMCI) and socially MCI. Moreover, the hedonic and social elements of motivation improved the attitude and usage intentions of robot service restaurants for senior customers. However, these relationships differed in terms of the income level of the customer groups. For the low-income senior-level group, hMCI was more influential on the perceived value. This study is meaningful because it analyzes the effect of MCI of seniors on the perceived value of robot service restaurants, which are growing rapidly in South Korea. It has empirically proved the moderating effect of different income groups, providing practical implications.

Keywords: motivated consumer innovativeness; perceived value; attitude; senior customers; robot service restaurants

1. Introduction

In South Korea, restaurants with artificial intelligence (AI) service robots use 3D space mapping and other technology, allowing the robots to move through the narrow lanes between tables and avoid obstacles to reach their destinations independently. Customers have found the robot service experience unique and interesting and have also felt safe from the coronavirus [1]. Service robots are equipped with food trays that can carry up to 30 kg and have liquid crystal display (LCD) screens and speakers that communicate in both Korean and English [2]. Meanwhile, a company called "Baemin" has launched an outdoor delivery robot that is expected to be used for food delivery. When orders are placed in a restaurant via a Baemin application, the robot delivers to the ground floor of the customer's building or residence. Afterwards, another robot inside delivers the food to the floor where the customer ordered. This service, which allows delivery robots to come and go outdoors between restaurants and apartments to deliver food, has become a reality for the first time in South Korea [3].

Internet users in the United States have stated that they would avoid visiting shopping centers or restaurants in the event of contracting the coronavirus infection. The respondents

were categorized in their respective age groups, which included 18–29-year-olds (67.9%), 30–44-year-olds (67.8%), 45–60-year-olds (79.3%), and those 61 years old and above (85.6%). The respondents answered that they would not visit shopping centers or restaurants. According to this report, people in the older age groups mostly responded that they would avoid visiting shopping centers or restaurants, thus avoiding contact with people, due to concerns about the spread of COVID-19 [4]. Therefore, older customers are expected to engage in online or non-face-to-face consumption activities rather than offline stores if possible, if a situation such as the COVID-19 pandemic persists or if a new virus outbreak creates a risk of infection [5].

AI robots are expected to replace various positions in restaurants, cafes, and the delivery industry [6]. Advanced technologies equipped with AI are becoming more personalized and specialized and are being applied to almost all areas of our lives [7,8]. Various studies have investigated factors affecting the systematic acceptance of users [9,10]. From users' perspective, using newly developed information technology (IT) products can be difficult, more so for older people [11,12].

The technology acceptance model (TAM) is the most widely adopted model of individual technology acceptance. Moreover, researchers have investigated whether this model is suitable for the field of application of new technologies, including social influence [13,14], learning motivation [15], technological complexity [16], technical support [17], and system integration [18,19].

However, despite several studies, it is acknowledged that universal and general results have not been successful. For example, in the case of new technology in telemedicine, users are influenced by certain factors of the newly adopted technology [20]. Although studies on the technical sector have been conducted, research on the perceived value of AI services from the customer side, especially robot services for senior customers, is now in its early stages [21]. Research targeting older people, which is rapidly increasing, is more urgent. Soon, seeing robot service in restaurants and cafes—especially for older people who order, receive, and consume the food—will become commonplace. Senior customers who dine out and are retiring are more likely to visit restaurants that have adopted robotic services rather than choosing fine-dining restaurants with full high-end services. Therefore, this study is indispensable for corporations' sustainability to prepare for senior customers' future motivations and the consumption values of robot service devices more empirically. To date, studies have included research on the eating tendencies of older people [22,23]. Furthermore, previous researchers have investigated the use of technological services by older people [24–27]. However, no research has been conducted on the motivation to innovate new technologies, consumption value, or usage intention for seniors who will encounter AI service robots in restaurants and cafes. In particular, in the case of seniors, it is urgent to prepare countermeasures, because the aging population of South Korea is rapidly growing. Together, the increasing customer preference for non-face-to-face services and the increasing corporate interest in these services will result in many restaurants introducing new technologies into their operating systems [28] for sustainability in the industry.

This study examines how the innovation motivation for senior customers' robot services affects the consumption value and usage intention when seniors visit food and beverage (F&B) facilities, such as robot service restaurants or cafes. Advances in social demand and technology will make it possible for restaurants to be equipped with robots that serve and cook food alongside human beings anywhere. This study examined how—moving beyond an aging society to an ultra-aging society—the customer innovation motivation of a restaurant (or cafe) provided by an AI robot that senior customers will inevitably meet in the South Korean food service industry will affect the perceived value and intention of use. By analyzing this impact, we aim to improve seniors' eating-out life, who will be the main customers of this future lifestyle, and to provide meaningful implications for the marketing strategies of food service companies that wish for permanent sustainability in terms of competition.

2. Theoretical Background and Research Hypotheses

2.1. Senior Restaurant Behaviors and Technology

Studies on the use of restaurant services by senior customers [29–31] and those on services that customers use in restaurants with the latest technology [32–34] have already been conducted by many researchers. However, no studies have looked at senior customers using technological robot services in restaurants. Soon, many "baby boomers" will have to use restaurant services with robots. Therefore, for the restaurant industry to be sustainable, it is necessary to deeply understand the motivated consumer innovativeness (MCI) of seniors in restaurants serviced by robots. This study is an empirical analysis on how motivated innovativeness affects perceived value when using a robot service restaurant by senior customers, which has not been studied by existing researchers, differentiating it from existing research.

2.2. Perceived Value

The perceived value represents the advantage of robotic technology toward higher quality service through its broad definition. Past research has usually studied perceived value based on user acceptance, interest in adoption, and perceived value for use (in the case of other technologies such as smartphones). Perceived value is sometimes taken for granted in services today. It is a multifaceted concept that includes many fields [21]. It can be subdivided into hedonistic, practical, functional, and emotional values [35,36]. This concept relates to service, which is often defined as a tradeoff among several other benefits. Perceived value can be defined as the ratio of perceived benefits and perceived costs. Ryu, Han, and Kim (2008) [37] found that the perceived value in their study was the customer's overall assessment of the net value of giving up (cost or sacrifice) for the benefits (material or emotional) provided. Existing studies have identified the quality and joy received from emotional responses or choices as a dimension of the perceived value of a product/service [38]. Cha (2020) [28] set the perceived value as perceived enjoyment and perceived trust in his research and proved empirically that it positively influenced customer intention to use service robots at restaurants. Satisfaction is considered more valuable than quality for perceived value in the service industry.

2.3. Motivated Consumer Innovativeness (MCI) by New Technology

The average age of the global population is continuing to increase. This is also a time when technical assistance for older people is increasingly needed. Cota, Ishitani, and Vieira (2015) [39] conducted a study to motivate older people to play mobile games. Hasan and Linger (2016) [40] further observed computer kiosks in elderly medical facilities. According to this research, many older people were found to feel connected to technology, with increased self-esteem, productivity, control, and enjoyment. This study applied the extended TAM theory. Researchers have widely demonstrated the validity and reliability of the TAM theory. However, scholars consider it insufficient to explain recent technological advances. Therefore, this study extended the TAM theory to investigate how senior customers in a restaurant would accept new technologies [41–43].

The MCI concept can be considered an extended TAM theory because it is investigated based on the rise of motivation and the adoption of new technologies. Based on the MCI model, this study attempted to measure consumers' intentions more accurately by adding perceived value. Motivation is regarded as both an external and internal factor that can influence a consumer's behavior toward achieving a goal [44,45]. Motivated consumer innovation combines the concepts of motivation and consumer innovation. The more motivated consumers are, the more likely they are to receive new technological services. Consumer innovation also leads consumers to purchase new services and products [46].

Consumers with a high level of innovation are willing to use new technologies. Therefore, MCI can be defined as the external and internal factors that lead to the innovative purchasing behavior of users [47]. This indicates that customer behavior is related to goals, such as emotional and work goals and social relationships. Customers behave differently

depending on their motives. Previous work shows that MCI has the following theoretical sub-dimensionality in the context of adopting new technologies: functionally motivated consumer innovation (fMCI), hedonically motivated consumer innovation (hMCI), socially motivated consumer innovation (sMCI), and cognitively motivated consumer innovation (cMCI) [48,49].

Robot services make human work more functionally convenient, making it easier to adopt in service industries such as restaurants [50]. fMCI contains task-specific and practical aspects [51], which suggests that if consumers have a high level of fMCI, they are more likely to take saving time and accuracy into great consideration when purchasing new technological services or products [52]. Through interactivity, robot services improve service quality and come across as hedonic appealing. In the context of a robotic restaurant, the relationship between hMCI and the entire image of robot services has been verified [53]. Service robots are in the early stages of service area expansion in restaurants; therefore, they can stimulate socially motivated innovativeness, providing the machine's perceived value [28]. sMCI is considered as an important part of purchasing innovative products or services because consumers want to improve the image through these purchases [49]. In adopting a new technology product or service, some studies have also highlighted the importance of sMCI [54]. New technology products or services generate consumer thought, which satisfies exploration, intellectual creativity, and understanding [44]. Consumers who have high levels of cognitively motivated consumer innovativeness are more likely to use a new technology product/service after considering its various advantages and disadvantages [49].

Based on the abovementioned existing studies, the following hypotheses are suggested.

Hypothesis 1 (H1). *fMCI will positively influence the perceived value of senior customers in robot service restaurants.*

Hypothesis 2 (H2). *hMCI will positively influence the perceived value of senior customers in robot service restaurants.*

Hypothesis 3 (H3). *sMCI will positively influence the perceived value of senior customers in robot service restaurants.*

Hypothesis 4 (H4). *cMCI will positively influence the perceived value of senior customers in robot service restaurants.*

2.4. The Effect of Perceived Value on Attitude and Usage Intention

First, it is assumed that an individual's perceived value plays an important role in determining attitudes toward technology. This attitude directly influences willingness to learn about new technologies. Background, skill, and level of knowledge can also directly influence the willingness to learn. It has been proven that the perceived value of robot service restaurants has a positive effect on satisfaction and revisit intention [55].

Older people tend to define life based on past experiences, achievements, education, and even age, which inevitably affects how they adapt to life as they age. Therefore, an individual's background, including their age and level of education, becomes more important. Furthermore, older people's attitudes directly influence their adoption of new skills [56]. Based on the abovementioned previous studies, the following hypotheses are presented.

Hypothesis 5 (H5). *Perceived value will positively influence the attitudes of senior customers in robot service restaurants.*

Hypothesis 6 (H6). *Perceived value will positively influence the intention of use of senior customers in robot service restaurants.*

2.5. The Effect of Attitude on Usage Intention

Kim and Qu (2014) [57] investigated the relationship between attitude and usage intention of hotel self-service kiosks. This study showed that attitude positively influenced usage intention. Therefore, if a consumer presents a positive attitude toward new technology, the willingness to use the robot service will increase. However, if the consumer presents a negative attitude toward such a technology, the robot service's usage intention will decrease. Based on this foundation, the following hypothesis is proposed.

Hypothesis 7 (H7). *Attitude will positively influence the usage intention of senior customers in robot service restaurants.*

2.6. The Moderating Effect of Income

Consumption patterns are often related to social class positions. Moreover, income differences are a good way to segment customers [58]. Allard, Babin, and Chebat (2009) [59] demonstrated that low-income customers are more susceptible to the hedonic dimensions of a shopping mall, while high-income customers are more susceptible to the utility dimensions. Sit, Merrilees, and Birch (2003) [60] further showed that the utilitarian group had the highest income, while the hedonic group had the lowest income.

Income level has a significant moderating effect on the relationship among convenience, website functionality, security, customer service, and customer satisfaction on online shopping [61]. Research results have confirmed that income level had a significant influence on customers' attitudes toward loyalty determinants in Croatia [62].

The following hypothesis is proposed based on such previous studies.

Hypothesis 8 (H8). *The effect of MCIs on the perceived value of senior customers varies by income.*

Figure 1 shows a research model with the proposed drivers (MCIs, perceived value, and usage intention).
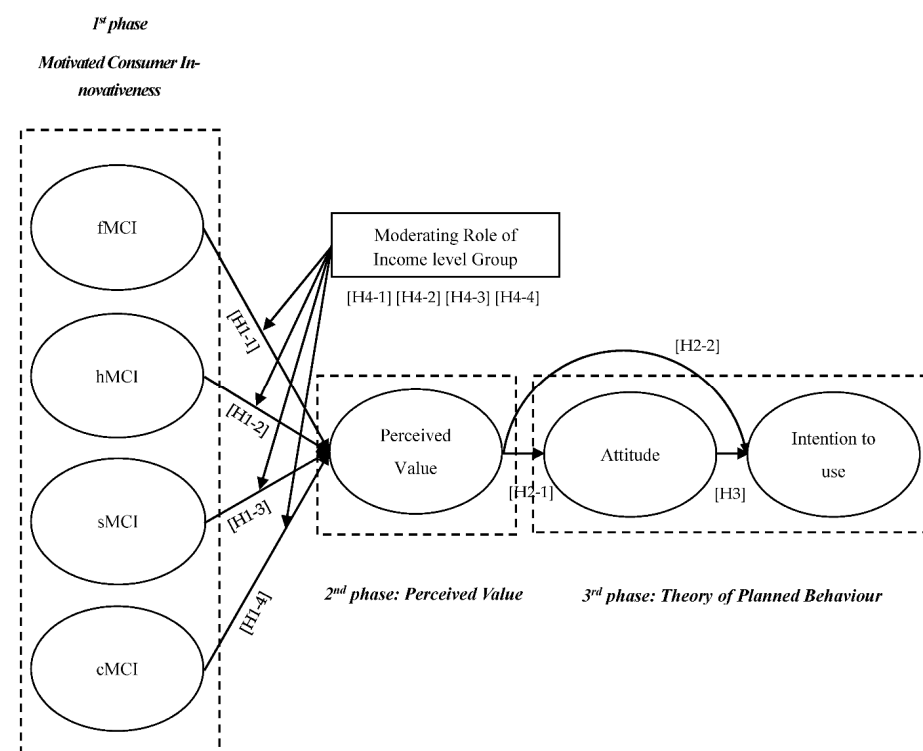
Figure 1. Research Model.

3. Materials and Methods

MaloneBeach and Langeland (2011) [63] conducted a study on providing necessary services to seniors, and survey subjects were over 50 years old. Wallmann et al. [64] surveyed senior women over 50 years of age in a study designed to evaluate senior dance classes' effect on static balance. Based on the preceding studies, this study specified the age of seniors as 50 years or older.

Usability and enjoyment have been shown to have a significant impact on older people's desire and willingness to use mobile devices for tourism purposes [65]. In South Korea, most seniors have become adept at using smartphones. Most seniors have smartphones and freely use them for photo sharing, social media, video chatting with acquaintances, shopping, and stock investment purposes [66,67]. We conducted a survey targeting seniors who had ever received automated service at restaurants, including kiosks, and participants were asked to respond to the survey after watching related videos (Appendix A).

Questionnaires from previous studies were considered to fit within the context of this study (Appendix B). Data were collected from September 1, 2020, to October 15, 2020, through an online survey company with professional competency in this field, in South Korea. A total of 255 questionnaires were issued; after excluding 12 incomplete responses, 243 questionnaires were retained for the analysis. The final sample consisted of 112 females (46%) and 131 males (54%). By age group, 68% were in their 50s, 17% were in their 60s, 13% were in their 70s, and 2% were aged 80 or above. Regarding the occupation of the respondents, there were 27 (11%) professional workers, 29 (12%) office workers, 56 (23%) housewives, 51 (21%) businesspersons, and 80 (33%) others. Most respondents, 45%, earned USD 1001–3000 monthly, 35% earned USD 3000–5000 monthly, and 12% had an income above USD 5000 per month. Table 1 shows the demographic characteristics of the survey respondents.

Table 1. Demographic characteristics of survey respondents.

Demographic Variables		Number of Sample (per)	Percentage (%)
Gender	Female	112	46
	Male	131	54
Age	50's	165	68
	60's	41	17
	70's	32	13
	Over 80's	5	2
Income per month (USD)	<500	2	1
	500–1000	17	7
	1001–3000	109	45
	3001–5000	85	35
	>5000	29	12
Occupancy	Professional	27	11
	Office worker	29	12
	Housewife	56	23
	Own Business	51	21
	Mics.	80	33
Expenditure for dining-out per month (thousand KRW)	<50	19	8
	50–100	85	35
	101–300	75	31
	301–500	51	21
	>500	12	5

4. Results

4.1. Evaluation Metrics

Firstly, the study performed confirmatory factor analysis (CFA) for statistical validation. The χ^2 statistic value of the research model was significant ($p < 0.001$), as shown in

Table 2. The result showed the normality of measurement items and did not show any concerning data issues. The model's overall fit was tested and considered satisfactory (NFI = 0.910, RFI = 0.894, IFI = 0.969, TLI = 0.963, CFI = 0.969, RMSEA = 0.044). Presenting desired convergent validity, the values of the composite reliability (CR) for all variables were above 0.6, and average variance extracted (AVE) was larger than the recommended [68] criteria (above 0.5). Moreover, the factor loadings of the measured items were statistically significant ($p < 0.05$). Therefore, this presented strong evidence of convergent validity. Table 2 presents the results of the CFA.

Table 2. Confirmatory factor analysis.

Variables	Measure	Standardized Regression Coefficient	CR	AVE
Functionally Motivated Consumer Innovativeness	fMCI1	0.742	0.87	0.62
	fMCI2	0.754		
	fMCI3	0.755		
	fMCI4	0.887		
Hedonically Motivated Consumer Innovativeness	hMCI1	0.737	0.88	0.64
	hMCI2	0.884		
	hMCI3	0.802		
	hMCI4	0.772		
Socially Motivated Consumer Innovativeness	sMCI1	0.807	0.90	0.70
	sMCI2	0.870		
	sMCI3	0.882		
	sMCI4	0.786		
Cognitively Motivated Consumer Innovativeness	cMCI1	0.826	0.87	0.63
	cMCI2	0.913		
	cMCI3	0.797		
	cMCI4	0.579		
Perceived Value	PEV1	0.729	0.87	0.63
	PEV2	0.764		
	PEV3	0.831		
	PEV4	0.845		

To test the discriminant validity, the study used the square root of the AVE; the value in the corresponding row and column was higher than 0.5, which is also higher than the non-diagonal correlation value ranging from 0.79–0.84, confirming decent discriminant validity. The results of the discriminant validity through the correlation analysis are shown in Table 3.

Table 3. Discrimination validity through correlation analysis.

	fMCI	hMCI	sMCI	cMCI	PEU	ATT	ITU
fMCI	0.79						
hMCI	0.61	0.80					
sMCI	0.59	0.52	0.84				
cMCI	0.41	0.26	0.64	0.79			
PEU	0.51	0.69	0.55	0.37	0.79		
ATT	0.63	0.54	0.63	0.50	0.61	0.80	
ITU	0.60	0.78	0.50	0.33	0.63	0.70	0.84

The values shown on the diagonal are the square root of AVE, and the rest are correlation coefficients.

4.2. Research Hypothesis Verification

The hypotheses were verified, and the results are shown in Table 4. The findings reveal that the fMCI and sMCI of robot service restaurants significantly influenced perceived value. This implies that the suggested MCIs of robot service restaurants can be important factors of customer perceived value. Additionally, the customers with higher perceived

value had a strong usage intention of the robot service in restaurants, as evidenced by the significant path coefficient from perceived value to usage intention. Figure 2 presents the results of the analysis.

Table 4. Results of research hypothesis.

Hypothesis	Paths	Path Coefficient	*t* Value	Results
H1	fMCI → PEV	0.064	0.91	Reject
H2	hMCI → PEV	0.612	7.22 ***	Support
H3	sMCI → PEV	0.149	2.06 *	Support
H4	cMCI → PEV	0.140	1.64	Reject
H5	PEV → ATT	0.857	9.57 ***	Support
H6	PEV → ITU	0.484	5.20 ***	Support
H7	ATT → ITU	0.327	4.32 ***	Support

Notes: * *p* < 0.05; *** *p* < 0.001.
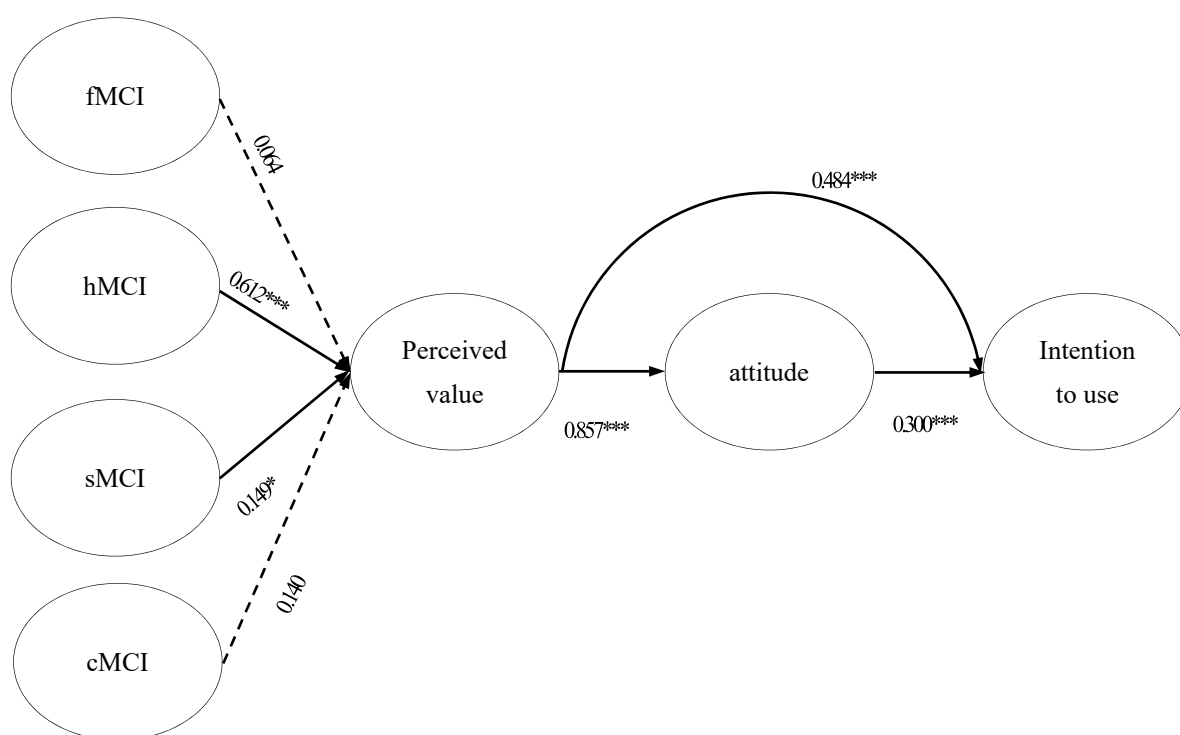
Figure 2. Structural equation modeling result of the research model. * *p* < 0.05; *** *p* < 0.001.

4.3. Moderator Effect of Income Level

To test the moderating effect of income levels, multigroup SEM was used [69]. To examine the effect of MCIs on senior customers' perceived value for service robots in restaurants, the total sample (*n* = 243) was divided into two groups: low and high income. Respondents earning less than USD 3000 each month were categorized as low income, while those categorized as high income earned more than USD 3000 per month. In Table 5, the results revealed that between perceived value and hMCI, income level was a significant moderator. The low-income group was more affected by fMCI, hMCI and cMCI in the perceived value path for service robots, while the high-income group was more affected by sMCI; however, apart from hMCI, the paths were not statistically significant. This means that the low-income group was more sensitive to the impact of hMCI on perceived value than the high-income group.

Table 5. Comparison of different income level group.

	Path	Path Coefficient		Comparison Results	Chi-Squared Increment	p-Value
		Low-Income	High-Income			
H1	fMCI	0.085	0.005	>	(d.f. = 1)	0.542
H2	hMCI	0.676	0.331	>	(d.f. = 1)	0.028 *
H3	sMCI	−0.067	0.067	<	(d.f. = 1)	0.342
H4	cMCI	0.196	0.049	>	(d.f. = 1)	0.322

Notes: * $p < 0.05$.

5. Discussion

Although research on robot services in the hospitality industry has been underway, research on robot services in the restaurant field is still in its early stages [70]. Several researchers have continuously studied customers' reactions to robotic services in restaurants; however, this relationship has not yet been established [28].

This study investigated the influence of motivated innovation on perceived value, attitude, and usage intention in customers of restaurants with robot services newly released in South Korea. The relationship among MCIs, perceived values, attitude, and usage intention was empirically analyzed through SEM.

6. Conclusions and Implications

The theoretical implications are as follows.

Firstly, the effect of fMCI in hypothesis 1 on perceived value was rejected. This result is slightly different from previous studies [71,72], which shows that the usefulness of robot services is related to the user's intention or attitude. In general, automated household machines (e.g., vacuum cleaners, clothes dryers, washing machines) used by consumers are mostly employed for the device's utility. However, there will be limitations in the usefulness required by senior consumers for robot services that have recently been introduced, especially service robots in restaurants. From the perspective of senior consumers, it seems that they expect more fun and interest than usefulness.

Secondly, the influence of hMCI in hypothesis 2 on perceived value was accepted. This result is the same as in previous studies [71,73], showing that the hedonic factors of robot service are related to the user's intention or attitude. In previous studies, low-income customers responded more to hedonic products and services, while high-income customers responded more sensitively to utilitarian products and services [59,60]. Seniors will feel more hedonically motivated innovativeness because their relative purchasing power is inevitably lower than the average of restaurant consumers. Tamilmani et al. (2009) [74] suggest that consumers are more likely to act when they have hedonistic motives. Compared with previous studies, this study was able to verify the existing literature and expand the research horizon by empirically confirming the effect of hMCI of senior customers on perceived value, especially in the field of robotic restaurants.

Thirdly, the effect of sMCI in hypothesis 3 on perceived value was also accepted. Khan et al. (2018) [75] suggest that consumers will have a high intention of action when they have a social motivation, such as social awareness. Cha (2020) [28] showed that sMCI positively affected user attitudes toward robot services in restaurants. Li, Zhang, and Wang (2015) [76] proved that sMCI helped to increase the intention of adopting a new product. This study also contributed to expanding the research horizon by empirically confirming the effect of sMCI of senior customers on perceived value in the field of robotic restaurants.

The effect of cMCI of hypothesis 4 on perceived value was rejected. However, previous researchers' studies show that cMCI's relationship with attitude had a positive effect. Vandecasteele and Geuens (2010) [44] suggest that when consumers are cognitively motivated for new technological services, they are more likely to have a good attitude toward service use. Reinhardt and Gurtner (2015) [49] found a significant relationship between cMCI and

customers' attitudes. Hwang, Kim, and Kim (2019) [53] found a positive relationship between cMCI and attitude in delivery food services using drones. In this regard, the current study expanded the role of cMCI by empirically identifying its impact on perceived value in robot service restaurants. Cognitive goals can be interpreted as exploration, intellectual creativity, etc. [44], but these characteristics are relatively low for seniors. Therefore, it is considered that cMCI and perceived value did not show a positive effect.

However, the effect of the perceived values of hypotheses 2-1 and 2-2 on the attitude and intention to use was revealed to have a statistically significant effect. This is a result that is consistent with the existing research contents. This is a similar result to the content of Kwun (2011) [77], which proved the hypothesis that food service quality, menus, and facilities affect the perceived value, and that perceived value affects customers' attitude and satisfaction. Choi and Lee (2012) [78] proved in their study that eco-friendly restaurant services affected the perceived value and that perceived value affected attitude and behavior intention.

Moreover, it was revealed that the influence of attitude in hypothesis 7 on the intention to use also had a statistically significant effect. This is consistent with the results of a study by Cha (2020) [28], which showed a very high correlation between the attitude and intention to use of consumers who want to use robot services.

Finally, in hypothesis 8, the relationship between the seniors' MCIs and perceived value according to the moderating effect of income level was significant only in the hMCI path. This is similar to the research findings [59,60], showing that low-income customers responded more to hedonic products and services, while high-income customers were more sensitive to utilitarian products and services.

The practical implications of this study are as follows.

Firstly, in this study targeting senior customers, hMCI, not fMCI, of robot restaurants influenced perceived value among MCIs. It can be seen that seniors value hedonic motivation when using restaurants serviced by robots. In general, the reasons for introducing robot services from companies' standpoint are efficiency and the economy. However, from a consumer point of view, robot services may not be as useful as human services. For older people, who are not familiar with IT devices, this becomes even more obvious. Therefore, in companies that introduce robotic services to restaurants, the effectiveness of service robots is also important, but the pleasure-motivating aspect of robots should not be overlooked.

Secondly, sMCI of senior customers showed a statistically high correlation with perceived value. This is in line with the fact that modern seniors have spent much time utilizing social networking activities with acquaintances using social network services. It is easy to think that seniors will have difficulty with advanced technology and will be uncomfortable with robot services due to this, but according to actual analysis, seniors regard the social motivation of robot services as an important value. Companies should study more friendly and social factors when developing the exterior design, voice, and music of robot services.

Thirdly, depending on the income level, the influence of MCIs on perceived value differed, and only the path between hMCI and the perceived value was significant. This means that senior groups with lower income levels are more sensitive to hMCI. Seniors who use robotic restaurants or who will use them in the near future will often not have relatively high-income levels within the senior group. In the case of restaurants where automation has recently been introduced, this explains the reason why inexpensive restaurants, such as quick service and fast-food restaurants, are in a hurry to introduce automated services to reduce labor costs. Therefore, when planning robot services, companies should devise a service robot's digital character size, voice strength, and movement speed so that seniors can use it more conveniently.

The limitations of this study are as follows. Most of the survey respondents perceived and used a robot service restaurant as a kiosk at a fast-food restaurant. Therefore, it is necessary to derive more accurate results by conducting a questionnaire survey among

customers who have used robot services in more formal restaurant settings. Therefore, in future studies, various types of robot service contexts will be required. Furthermore, increased in-depth research is needed for users of robot services at restaurants.

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Appendix A

Figure A1. Inside Korea's amazing AI Restaurant! Let a ROBOT take your order! A Captured snapshot from YouTube (https://www.youtube.com/watch?v=GAUt5Q8taB4&t=239s, accessed on 3 February 2021).

This video is 10 min 6 s long, but only 3 min and 40 s were shown to respondents for the survey.

Appendix B

Constructs	Items	Measures	References
Functionally motivated consumer innovativeness	fMCI1	The service robot in the restaurant seems to provide easy service.	[44,79]
	fMCI2	The service robot in the restaurant seems to be efficient.	
	fMCI3	The service robot in the restaurant seems to be convenient.	
	fMCI4	The service robot in the restaurant is likely to shorten service times.	
Hedonically motivated consumer innovativeness	hMCI1	The service robot in the restaurant seems to make life exiting and pleasant.	[44]
	hMCI2	It seems to give me a good mood when using a service robot in the restaurant.	
	hMCI3	The discovery of newness of the service robot in the restaurant makes me joyful.	
	hMCI4	The technology of the service robot in the restaurant makes me cheerful.	
Socially motivated consumer innovativeness	sMCI1	The service robot in the restaurant could impress others.	[44]
	sMCI2	Using the service robot in the restaurant can tell I am an innovator.	
	sMCI3	Using the service robot in restaurant could make me different from others.	
	sMCI4	I like to use the novelty of the service robot in restaurants which others do not use.	
Cognitively motivated consumer innovativeness	cMCI1	I am likely to use the service robot in the restaurant after comparing its advantages and disadvantages.	[44]
	cMCI2	It is likely to make me think logically when using the service robot in the restaurant.	
	cMCI3	I am likely to use the service robot in the restaurant after considering its various aspects.	
	cMCI4	I am likely to use the service robot in restaurants which satisfies my analytical mind.	
Perceived value	PecV1	The service robot in the restaurant shows excellent performance.	[55]
	PecV2	The use of the service robot in the restaurant delivers a satisfactory experience.	
	PecV3	Using the service robot in restaurants gives me sufficient value.	
	PecV4	The service quality of the service robot in restaurant is excellent.	
Attitude	Atti1	It seems to be good idea to use the service robot in restaurants.	[57]
	Atti2	I have a positive attitude toward the service robot in restaurants.	
	Atti3	I have a pleasant attitude about the service robot in restaurants.	
	Atti4	I have a nice feeling about the service robot in restaurants.	
Intention to use	Inte1	If there is a chance, I would use the service robot in a restaurant.	[57]
	Inte2	I would like to use the service robot in a restaurant in the future.	
	Inte3	I would like to use the service robot in a restaurant when ordering food.	
	Inte4	I hope to use the service robot in a restaurant in the near future.	

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