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Do Consumers Intend to Use Indoor Smart Farm Restaurants for a Sustainable Future? The Influence of Cognitive Drivers on Behavioral Intentions

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Abstract: Smart farms are eco-friendly and sustainable agriculture practices that also play a crucial role in the foodservice industry. This study investigated cognitive drivers, which included biospheric value, environmental concern, problem awareness, and ascription of responsibility, in order to form consumers' behavioral intentions in the context of indoor smart farm restaurants. The current study also investigated the differences among the four sub-dimensions of cognitive drivers, which are based on the respondents' demographic factors. This study was performed using data from 310 participants. The study conducted multiple linear regression to test the causal relationships and *t*-test and one-way ANOVA to test the demographic differences. The results of the data analysis revealed that all four sub-dimensions of the cognitive drivers aid in regard to increasing behavioral intentions. Furthermore, the data analysis results showed that age and marital status were associated with differences in biospheric value, and gender was associated with differences in environmental concern and problem awareness. This study empirically identified the direct effect of cognitive drivers on consumers' pro-environmental behavior and their demographic differences, and it also presents practical suggestions from the perspective of green marketing.

Keywords: indoor smart farm restaurant; cognitive driver; behavioral intention; demographic factor



Citation: Joo, K.; Hwang, J. Do Consumers Intend to Use Indoor Smart Farm Restaurants for a Sustainable Future? The Influence of Cognitive Drivers on Behavioral Intentions. *Sustainability* **2023**, *15*, 6666. <https://doi.org/10.3390/su15086666>

Academic Editor: Brian Garrod

Received: 1 March 2023

Revised: 13 April 2023

Accepted: 13 April 2023

Published: 14 April 2023



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1. Introduction

Sustainable agriculture can help reduce the environmental pollution that is caused by conventional agriculture practices, such as excessive water and chemical inputs, soil degradation, and habitat destruction [1,2]. Smart farms can improve the efficiency and effectiveness of sustainable agriculture practices by using precision agriculture techniques in order to optimize resource use and crop management [3,4]. Moreover, smart farms reduce the carbon footprint compared to conventional agriculture, which causes climate change due to soil carbon emissions [5,6]. Some restaurants utilize smart farms in their operations in order to grow fresh produce on-site, which reduces their carbon footprint and ensures a steady supply of fresh produce [7,8]. These cases, which are called *indoor smart farm restaurants* (hereafter ISFRs), emerged in Asia and Europe [9]. For instance, a restaurant brand in Hong Kong, which is called *Interval*, launched an ISFR by cooperating with the smart farm firm *Farmacy HK* [10]. It reported that the customers could see the chefs handpick salad greens and edible herbs from the smart farms and garnish their dishes. Joo et al. [9] studied the ISFR's potential consumers, and they emphasized norm activation and self-interested motives in regard to enhancing the consumers' behavioral intentions. However, there is still insufficient research about consumer behavior in the field of ISFRs.

Pro-environmental behavior is more importantly fostered based on diverse cognitive drivers [11–13]. Cognitive drivers are psychological factors that motivate individuals in regard to decision-making, and these drivers influence the individuals' behaviors that are related to sustainability [14–16]. The extant studies of factors such as biospheric value (BV), environmental concern (EC), problem awareness (PA), and ascribed responsibility

(AR) provide evidence for consumers' pro-environmental behavior [17–19]. For instance, Liang et al. [20] also proved that consumers' biospheric value plays a significant role in forming intentions to purchase green apparel products. Siyal et al. [21] also found that environmental concerns had a significant impact on intentions to purchase eco-friendly organic food products. Li et al. [22] also proved that when consumers are aware of environmental issues, they are more likely to purchase green products. Joshi and Rahman [23] demonstrated that consumers' drive for environmental responsibility had a positive influence on sustainable purchase behavior. There are still no studies that examine them in the ISFR field despite the importance of cognitive drivers. The present study focuses on the four cognitive drivers in regard to investigating the behavioral intentions of potential ISFR consumers. In addition, research that overlooks the demographic factors cannot successfully assess pro-environmental behavior [24]. For instance, Eagly [25] stated that females are more aware of environmental issues. Previous studies also state that older consumers are more likely to have a high level of ecological concerns and a higher tendency to exhibit more pro-environmental behavior than younger consumers [26]. Nonetheless, research on the differences in the cognitive drivers that is based on demographic factors is insufficient. This research tried to further strengthen the prior literature by investigating the effect of differences in demographic factors on the cognitive drivers.

ISFR is not yet common worldwide including in Korea, which is where this study was conducted, so it is crucial to investigate the consumer behavior of prospective future customers of ISFR. Thus, this study focused more on the concept of cognitive drivers in order to examine the ISFR consumers' pro-environmental behavior. The objectives of this paper are as follows. (1) Investigate the cognitive drivers as predictors of consumer behavior in the context of ISFRs, (2) identify the influence of the cognitive drivers on behavioral intentions, and (3) investigate differences in the cognitive drivers, which are based on the demographic factors.

2. Literature Review

2.1. Indoor Smart Farm Restaurants (ISFRs)

According to the standard population projection, agriculture productivity has to be increased by more than 50% in the near future due to the growing population and climate change [27,28]. Vertical farming, a method of hydroponically cultivating crops in stacked trays, contributed to increasing agricultural productivity per area [29,30]. Furthermore, the application of IoT (Internet of Things)-based automation systems to vertical farming presented dramatically increasing production efficiency [9,31]. It is called "Smart Farming", which can automatically control various aspects of the environment, such as light, water supply, and air condition, to enhance productivity and efficiency in agriculture [1,3,4]. They also have the potential to enhance food security and sustainability by enabling the real-time monitoring of crop growth, soil moisture, and other environmental factors [4,32]. Huang et al. [5] emphasized the eco-friendly role of smart farms as a solution to the challenges of climate change and environmental degradation by reducing carbon emissions and preserving natural resources. Smart farms reduce the carbon footprint compared to conventional agriculture, which causes climate change due to soil carbon emissions [5,6].

Some restaurants use smart farms in their operations in order to grow fresh produce on-site, which reduces their carbon footprint and ensures a steady supply of fresh produce [7,8], and Joo et al. [9] defined this type of restaurant that uses smart farming to produce ingredients as an ISFR. They mainly have been emerging in Asia and Europe [9]. For instance, a restaurant brand in Hong Kong, which is called *Interval*, cooperated with a smart farm firm in Hong Kong, which is a representative case of an ISFR [10]. The restaurant Beba, which is in Germany, also set up smart farms near the customer tables and used the greens from the smart farms [8]. Joo et al. [9] studied the ISFR consumers' decision-making process for the first time. They integrated the theory of planned behavior (TPB) and the norm activation theory (NAM), and they identified the moderating role of age. However, they could not capture the effect of the cognitive drivers, such as biospheric value and

environmental concern, and there were also limited investigations into the impact of the demographic factors.

2.2. Cognitive Drivers

Cognitive refers to mental processes that are related to thinking and perceiving, which are essential for making decisions and understanding the world around us [33–35]. Cognitive drivers refer to psychological factors that motivate individuals in regard to decision making that is related to a specific behavior, such as pro-environmental consumption [14,16]. Previous studies emphasized the important role of cognitive drivers in regard to forming the consumers' pro-environmental decision-making process [11,13,36]. The extant studies of factors, such as biospheric value, environmental concern, problem awareness, and ascribed responsibility provide evidence for the consumers' pro-environmental behavior [18,19,37]. First, biospheric value is the extent that individuals see themselves as being connected to and dependent on the natural environment [16]. It also involves the individuals' value that nature should be preserved, which can influence their willingness to engage in environmental protection [37]. Second, environmental concern refers to the degree that individuals worry about environmental problems [15]. It reflects an individual's moral obligation in regard to protecting the environment sustainably and its natural resources [38]. Third, problem awareness is the extent that individuals recognize and understand environmental pollution problems [14]. It is the recognition and understanding of these types of issues and their potential impact on society and the natural world [39,40]. Finally, ascription of responsibility is a psychological concept that refers to the extent that individuals believe that they are responsible for addressing environmental issues [41,42]. It involves being responsible for environmental problems and their willingness to act in order to address them [43]. The present study adapted the four constructs of cognitive drivers in order to predict consumer behavior in the context of ISFRs.

2.3. The Effects of Cognitive Drivers on Behavioral Intentions

Previous studies applied these four cognitive drivers in order to investigate consumers' pro-environmental behavior. For instance, Han et al. [13] identified that the four cognitive drivers form consumers' moral norms and that they lead to environmental pro-environmental behavioral intentions in the cruise context. Choe et al. [11] proved that the four cognitive drivers lead to personal norms, which positively affect behavioral intentions in the field of environmentally friendly edible insect restaurants. In addition, the norm activation theory (NAM) [41], the value-belief-norm theory (VBN) [44], and the theory of green purchase behavior (TGPB) [45] also support the crucial role of cognitive drivers in the process of forming behavioral intentions.

The cognitive drivers can more importantly directly influence consumers' pro-environmental behavior. First, biospheric value is significantly associated with pro-environmental behaviors [16]. Biospheric value makes individuals see themselves as being connected to and dependent on the natural environment, so it can influence their willingness to engage in green consumption [37]. Biospheric value has also been found to be a significant predictor of pro-environmental behaviors because the value reflects a concern for the natural environment and a desire to protect it [46]. Liang et al. [20] also proved that consumers' biospheric value plays a significant role in forming intentions to purchase green apparel products. It can be inferred that potential consumers' biospheric value would positively affect behavioral intentions toward eco-friendly ISFRs.

Hypothesis 1 (H1). *Biospheric value positively influences behavioral intentions.*

Second, environmental concern is the degree to which individuals are worried about environmental issues, so it is another essential cognitive driver that influences green consumption behavior [47]. Hines et al. [48] discovered that concern for the environment was a significant predictor of pro-environmental behaviors. Hartmann and Apaolaza-Ibáñez [49]

also proved the positive effect of environmental concern on purchase intentions in regard to using green energy brands. Siyal et al. [21] also found that environmental concerns had a significant impact on intentions to purchase eco-friendly organic food products. Based on the discussions above, potential consumers' environmental concerns can play a significant role in forming behavioral intentions in the context of ISFRs.

Hypothesis 2 (H2). *Environmental concern positively influences behavioral intentions.*

Third, problem awareness about environmental pollution is also positively associated with pro-environmental behavior [14]. Problem awareness makes consumers understand these types of issues and their potential impact on society and the natural world [39,40], so they would be willing to choose a better way for sustainable environmental protection. Li et al. [22] also proved that when consumers are aware of environmental issues, they are more likely to purchase green products. It can be inferred that potential consumers' problem awareness can foster pro-environmental behavior. Thus, ISFR consumers' problem awareness would influence behavioral intentions.

Hypothesis 3 (H3). *Problem awareness positively influences behavioral intentions.*

Lastly, ascription of responsibility is the degree to which individuals feel responsible for environmental problems and their willingness to act to address them, which can also affect green consumption behavior [36,43]. For instance, Dagher and Itani [50] stated that consumers are more likely to engage in green consumption when perceiving environmental responsibility. Joshi and Rahman [23] demonstrated that consumers' drive for environmental responsibility had a positive influence on sustainable purchase behavior. Alssad et al. [51] also identified a significant effect of ascription of responsibility on pro-environmental behavioral intentions in the context of social media. Thus, ISFR consumers' ascription of responsibility can play a positive role in forming their behavioral intentions.

Hypothesis 4 (H4). *Ascription of responsibility positively influences behavioral intentions.*

2.4. Differences in Cognitive Drivers Based on Demographic Factors

Demographic factors, which include gender, age, marital status, education level, and monthly income level, are regarded as crucial elements in green consumer research [52–54]. For instance, Kim et al. [55] found differences in consumers' internal environmental locus of control level according to gender, age, marital status, education level, and monthly income. The present study also tried to investigate differences in the cognitive drivers based on demographic factors, which is similar to their study, so there is also sufficient theoretical evidence for demographic differences. Eagly [25] studied gender differences in social behavior, and the study showed that females are more aware of environmental issues. The extant literature also states that older consumers are more likely to have a high level of ecological concerns and a higher tendency to exhibit more pro-environmental behavior than younger consumers [24,26]. Jorgensen and Stedman [56] also demonstrated that married individuals are more likely to engage in environmentally responsible behaviors than single individuals. Gatersleben et al. [57] identified that consumers with high education and income levels are more concerned about environmental problems. These studies support the idea that there are differences in consumers' values and concerns about the environment, awareness about environmental pollution, and responsibility based on demographic factors. Thus, the present study proposes the hypothesis below.

Hypothesis 5 (H5). *There are differences in the cognitive drivers based on demographic factors.*

2.5. Proposed Research Model

The conceptual model, which is illustrated in Figure 1, is presented in this study according to the proposed hypotheses.

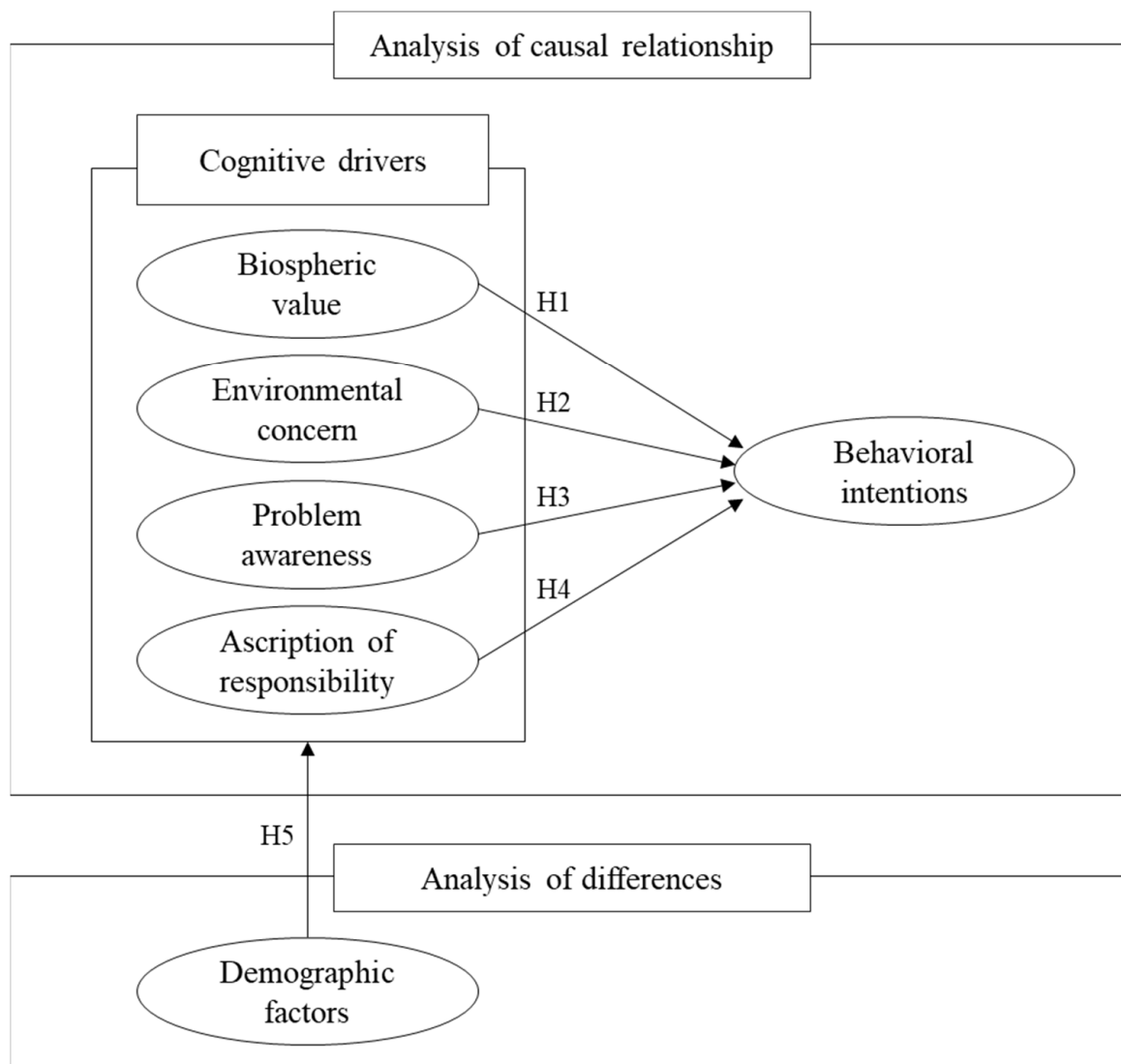


Figure 1. Proposed conceptual model.

3. Methodology

3.1. Measures

The measurement items that are used in this study are based on previous research. The four constructs of cognitive drivers, which include biospheric value, environmental concern, problem awareness, and ascription of responsibility, were measured using twelve items that were drawn from Choe et al. [11], Han et al. [13], Liang et al. [20], Siyal et al. [21], Li et al. [22], and Joshi and Rahman [23]. Behavioral intentions were measured using 3 items, which were drawn from Ajzen [58] and Joo et al. [9]. The study made some modifications to the original items in order to better fit the context of ISFRs, and they were carefully reviewed by faculty members and survey experts. The study measured all 15 items using a 7-point Likert scale, which ranged from (1) *strongly disagree* to (7) *strongly agree*. Finally, the present study collected information about demographic factors, which included gender, age, marital status, education level, and monthly income.

3.2. Data Collection and Analysis

The data were collected using the largest survey company in Korea, which includes over 1.5 million panelists. A total of 5792 panelists who had eaten out within the last six months were sent an email survey by the company. The panelists were shown a video and article that fully explained ISFRs and their eco-friendly aspect before the survey. A token of gratitude of approximately USD 1 was given to the panelists after they completed the survey. The data that were collected included 330 panelists, and the study used 310 panelists after removing 20 multivariate outliers. The study conducted multiple linear regression, *t*-test, and one-way ANOVA to test the suggested hypotheses using SPSS 22.0 software.

4. Data Analysis

4.1. Profile of Respondents

Table 1 presents the profile of the respondents ($n = 310$). Among the respondents, 48.7% were males ($n = 147$) and 51.3% were females ($n = 155$). The average age of the respondents was 36.86 years. The respondents with a monthly household income of USD 2001 to USD 3000 constituted the largest group, which accounted for 28.8% ($n = 87$). The majority of the respondents, who accounted for 52%, were single ($n = 157$), and 62.9% of them have a bachelor's degree ($n = 190$).

Table 1. Respondent profiles ($n = 310$).

Variables	<i>n</i>	%
Gender		
Male	147	48.7
Female	155	51.3
Age (Mean = 36.86)		
20s	86	28.5
30s	92	30.5
40s	92	30.5
50s	32	10.6
Monthly income		
Under USD 2000	51	16.9
USD 2001–3000	87	28.8
USD 3001–4000	66	21.9
USD 4001–5000	38	12.6
Over USD 5001	60	19.9
Marital status		
Single	157	52.0
Married	134	44.4
Widowed/Divorced	11	3.6
Educations level		
Less than high school diploma	31	10.3
Associate degree	45	14.9
Bachelor's degree	190	62.9
Graduate degree	36	11.9

4.2. Principal Component Analysis

This study conducted a principal component analysis in order to assess the sub-dimensions of the cognitive drivers, and the results are presented in Table 2. The study discovered that all four cognitive drivers were unidimensional with eigenvalues that exceeded 1.0, which indicates their validity. The validity was also confirmed by a high Kaiser–Meyer–Olkin, which will hereafter be referred to as KMO, value of 0.924 and a statistically significant Bartlett's test of sphericity at $p < 0.001$. The factor loadings for all values were higher than 0.7. The internal consistency was appropriate, which was confirmed by Cronbach's alpha values being greater than 0.7 for each construct. The behavioral intentions were also

assessed by conducting a principal component analysis, and the results are presented in Table 3. The validity was also confirmed by a high KMO value of 0.75 and a statistically significant Bartlett's test of sphericity at $p < 0.001$. The factor loadings for all the values and Cronbach's alpha for each construct were higher than 0.9.

Table 2. Results of the principal component analysis for the cognitive drivers.

Construct and Scale Items	Factor Loading	Eigen Value	Explained Variance	Cronbach's α
Cognitive drivers				
Biospheric value (5.57 and 1.09)		3.015	25.112	0.960
<i>Please indicate to what extent the following are important as guiding principles in your life from (1) very unimportant to (7) very important.</i>				
Preventing pollution (conserving natural resources)	0.867			
Respecting the earth (harmony with other species)	0.881			
Protecting the environment (preserving nature)	0.876			
Environmental concern (5.90 and 1.01)		2.136	17.804	0.903
The balance of nature is very delicate and easily upset.	0.820			
Humans are severely abusing the environment.	0.858			
The earth is like a spaceship with limited room and resources.	0.815			
Problem awareness (5.81 and 1.04)		2.995	24.959	0.950
The foodservice industry can lead to environmental pollution, such as carbon emissions, food wastes, and disposable products.	0.737			
The foodservice industry can potentially have a negative impact on global warming	0.786			
The foodservice industry can lead to the exhaustion of natural resources.	0.796			
Ascription of responsibility (5.50 and 1.04)		2.636	21.963	0.951
I believe that every restaurant customer is partly responsible for the environmental contaminants, such as carbon emission, food waste, and disposable products, which are caused by the foodservice industry.	0.686			
I feel that every restaurant customer is jointly responsible for the environmental deteriorations that are caused by the environmental contaminants, such as carbon emissions, food waste, and disposable products, which are generated in the foodservice industry.	0.733			
Every restaurant customer must take partial responsibility for the environmental problems that are caused by the environmental contaminants, such as carbon emissions, food waste, and disposable products, which are generated in the foodservice industry.	0.719			
KMO measure of sampling adequacy = 0.924, Bartlett's test of sphericity $p < 0.001$, and total explained variance = 89.848%.				

Table 3. Results of the principal components analysis for behavioral intentions.

Variables (Mean and Standard Deviation)	Factor Loading	Eigen Value	Explained Variance	Cronbach's α
Behavioral intentions (5.31 and 0.98)		2.620	87.344	0.927
I will visit eco-friendly ISFR when I dine out.	0.923			
I'm willing to visit eco-friendly ISFR when I dine out.	0.952			
I'm likely to visit eco-friendly ISFR when I dine out.	0.929			
KMO measure of sampling adequacy = 0.750 and Bartlett's test of sphericity $p < 0.001$				

4.3. Result of the Convergent and Discriminant Validities Test

Table 4 indicates Pearson correlation coefficients and the convergent and discriminant validities test. The composite reliabilities of the seven proposed concepts ranged from 0.756 to 0.954, the average variance extracted value of each concept ranged from 0.508 to 0.874, and the correlation coefficient between all concepts was lower than the root square value of the average variance extracted values. The results indicated that internal consistency ($CR > 0.7$), convergent validity ($AVE > 0.5$), and discriminant validity (correlation $< \sqrt{AVE}$) satisfied the cutoff.

Table 4. The convergent and discriminant validities.

	CR	AVE	BV	EC	PA	AR	BI
BV	0.907	0.765	0.875				
EC	0.870	0.691	0.644 **	0.831			
PA	0.817	0.598	0.671 **	0.687 **	0.773		
AR	0.756	0.508	0.580 **	0.694 **	0.688 **	0.713	
BI	0.954	0.874	0.515 **	0.474 **	0.481 **	0.469 **	0.713

Notes: BV = Biospheric value, EC = Environmental concern, PA = Problem awareness, AR = Ascription of responsibility, BI = Behavioral intention, CR = Composite reliability, AVE = Average variance extracted, $\sqrt{AVE}$ values are along the diagonal (boldface), and Pearson correlation coefficients are below the diagonal (** $p < 0.01$ two-tailed).

4.4. Result of Regression: The Effect of the Cognitive Drivers on Behavioral Intentions

Table 5 presents the result of the regression analysis conducted in order to test the hypotheses of the effects of the cognitive drivers on behavioral intentions. The results revealed that biospheric value ($\beta = 0.376$, $t = 7.954$, and $p < 0.001$), ascription of responsibility ($\beta = 0.277$, $t = 5.863$, and $p < 0.001$), environmental concern ($\beta = 0.253$, $t = 5.353$, and $p < 0.001$), and problem awareness ($\beta = 0.189$, $t = 4.003$, and $p < 0.001$) positively affect behavioral intentions. That is, all four constructs of cognitive drivers played significant roles in forming behavioral intentions in the context of ISFRs, so H1, H2, H3, and H4 were supported.

Table 5. The results of the regression: The effect of cognitive drivers on behavioral intentions.

Independent Variable	Dependent Variable	Beta	t-Value	VIF	Hypothesis
H1 Biospheric value →	Behavioral intentions	0.376	7.954 ***	1.951	Supported
H2 Environmental concern →		0.253	5.353 ***	2.891	Supported
H3 Problem awareness →		0.189	4.003 ***	3.024	Supported
H4 Ascription of responsibility →		0.277	5.863 ***	2.757	Supported

ANOVA (Regression; Residual): Sum of squares (98.315; 210.685), df (4; 305), Mean square (24.579; 0.691), F -value = 35.581, and $p < 0.001$. Notes: *** $p < 0.001$, $R^2 = 0.318$, and Adjusted $R^2 = 0.309$.

4.5. Results of the t-Tests and the One-Way ANOVA: Differences in Demographic Factors on the Cognitive Drivers

Table 6 presents the results of the t -tests and the ANOVA, which were conducted in order to test the hypothesis of the differences in the cognitive drivers, which were based on

demographic factors. A p -value that was less than 0.1 was used as the cutoff for significance in the present study, which was based on extant studies [55,59–61]. The results of the t -tests showed that there were significant differences in environmental concern ($t = -2.284$ and $p < 0.05$) and problem awareness ($t = -2.880$ and $p < 0.01$) based on gender. It indicated that females had higher environmental concern and problem awareness than males did. The results of the ANOVA showed that there were significant differences in biospheric value based on age ($F = 2.862$ and $p < 0.05$) and marital status ($F = 2.578$ and $p < 0.1$). The post hoc tests indicated that individuals in their 20s had higher biospheric value than individuals in their 30s and individuals in their 50s or older. Additionally, married individuals had higher biospheric value than single individuals. However, the differences in ascribed responsibility based on demographic factors were found to be insignificant. Therefore, H5 was only partially supported.

Table 6. The results of the t -tests and one-way ANOVA: differences in demographic factors on the cognitive drivers.

Gender	Male		Female		t -Value	p -Value
Environmental concern	5.77		6.03		−2.284 **	0.023
Problem awareness	5.64		5.97		−2.880 ***	0.004
Age	20 s	30 s	40 s	More than 50	F -value	p -value
Biospheric value	5.33 ^{ab}	5.65 ^a	5.62	5.92 ^b	2.862 **	0.037
Marital status	Single	Married	Others		F -value	p -value
Biospheric value	5.44 ^a	5.72 ^a	5.76		2.578 *	0.078

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, and the upper letters show the results of LSD (Least Significant Difference) post hoc test.

5. Discussions and Conclusions

5.1. Theoretical Implications

First, the present study successfully investigated cognitive drivers in the context of ISFRs. Cognitive drivers are the psychological factors that motivate individuals to decide about a specific behavior, such as pro-environmental consumption [14,16]. This study adopted four constructs of cognitive drivers, which included biospheric value, environmental concern, problem awareness, and ascription of responsibility. The cognitive drivers were regarded as predictors of norms that play a significant role in forming behavioral intentions based on previous theories such as the NAM [41], the VBN [44], and the TGPB [45]. While recent studies in the green research field adopted these models [9,11,13], this study hypothesized the direct effects of cognitive drivers on behavioral intentions based on the previous literature e.g., [14,36,46,49]. The results of the regression analysis revealed that all four cognitive drivers significantly influence behavioral intentions. Previous theories limited the roles of cognitive drivers as predictors of norms, but this study presents a theoretical extension showing the significant roles of cognitive drivers in arousing behavioral intentions.

Second, this study also presents theoretical extensions that investigated differences in the cognitive drivers, which are based on demographic factors. The study focused on five demographic factors, such as gender, age, marital status, education level, and monthly income level, which are considered to be crucial elements in green consumer research [52–54]. The study hypothesized that there are differences in the cognitive drivers according to demographic factors, which is based on the previous literature [20,44–47]. The results of the analysis revealed that there were partially significant differences in the cognitive drivers according to gender, age, and marital status. These findings are consistent with the studies on green consumers, such as those by Eagly [25], Jorgensen and Stedman [56], Roberts [24], and Vining and Ebreo [26]. Whereas previous studies focusing on cognitive drivers overlooked the differences in them according to demographic

factors e.g., [11,13,20,21], the study successfully found differences in the cognitive drivers according to demographic factors.

However, there were no significant differences in the cognitive drivers according to education level and monthly income, which is not in line with the study by Gatersleben et al. [57]. There may not be a significant difference in cognitive abilities based on these two factors, which is due to the education and income levels being significantly increased over the past two decades. Nevertheless, Kim et al. [55] found differences in internal environmental locus of control based on the level of education and income in the foodservice context. The concept of locus of control is the extent to which people perceive that they control their behavior [62]. This means that differences in individuals' green characteristics according to demographic factors can be different according to the locus of behavioral control or the cognitive drivers. These results and discussions provide a theoretical extension to the field of pro-environmental consumer behavior.

5.2. Practical Suggestions

First, ISFR marketers can promote the eco-friendly roles of smart farms in order to enhance consumers' behavioral intentions. The study identified that biospheric value and environmental concern positively affect behavioral intentions. Conventional agriculture's harm to the biosphere is due to soil carbon emissions [5,6], so consumers may not generally perceive it very well. Marketers can promote the eco-friendliness of smart farms for a sustainable future by emphasizing these environmental concerns to consumers. This publicity can serve as the first step towards raising awareness of ISFRs among consumers.

Second, marketers should establish promotions that make foodservice consumers aware of environmental issues as well as have responsibility for them. This study demonstrated that problem awareness and ascription of responsibility have positive effects on behavioral intentions. Restaurants can cause environmental degradation because they use inefficient energy/water use practices and emit carbon dioxide [63,64]. ISFRs strive to minimize environmental degradation via a sustainable agricultural system. Marketers can launch promotional campaigns that encourage consumers to participate in environmental protection. For instance, consumers can receive a discount voucher for their next visit to an ISFR if they post pictures with specific hashtags on their social media accounts after their visit. Specific hashtags can be designated, such as #environmental_protection, #sustainable_dining, and #green_restaurant.

Finally, a customer-targeting strategy can be established that is based on demographic factors. The results of the *t*-test indicated that female consumers have higher environmental concern and problem awareness than male consumers do. The results of the ANOVA indicate that consumers who are in their 50 s have higher biospheric value than consumers who are in their 20 s and 30 s, and married consumers have higher biospheric value than single consumers. It can be inferred that the optimal target customers for ISFRs are females, more than 50 years old, and married. For instance, ISFRs may not be appropriate for fast-food restaurants that have small table spaces and rely on self-service. The fast-food ISFR case involving *Good Stuff Eatery* canceled its ISFR after five months of launching, which was due to sluggish business performance [65]. An ISFR will be appropriate for family restaurant types with large table spaces and a full-service basis, and they should consider gender, age, and marital status. If an ISFR launch plan is established based on these types of optimized targets, it will evoke consumers' cognitive drivers and lead to their behavioral intention.

5.3. Limitations and Future Research

First, the study utilized data that were measured from one survey, which may have a common method bias [66]. Future research should consider data collection methods that minimize the possibility of this issue. Second, the generalizability of the findings is limited because the study collected respondents only from Korea. There may be variations in individuals' cognition and behavior based on cultural dimensions [67], so it is recom-

mended that further research incorporate these cross-cultural differences as a moderator. Third, word-of-mouth intentions and willingness to pay more are also regarded as crucial behaviors in the green research field [55,68,69]. A comprehensive investigation that includes these two behaviors as dependent variables and investigates their predictors in the context of ISFRs is suggested. Fourth, the study overlooked the moderating role of consumers' demographic factors. For example, consumers' decision-making processes of pro-environmental behavior can be moderated by their gender or age [9,70]. It implies that future research should consider the moderating role of demographic factors. Lastly, the study used a sufficient panelist size grounded on previous studies [71,72], but the study could not test whether panelists fully understood the research background. It suggests that future research can use attention-check questions about the research background after panelists read/watch the articles/videos. The panelists for this study also did not represent actual visitors of ISFRs, because ISFRs have not yet been fully commercialized in Korea. The study suggests future research that targets actual visitors of ISFRs and considers their behavioral descriptors (e.g., restaurant attendance, average expenditure, etc.) as control variables or difference factors.

Author Contributions: Conceptualization, K.J. and J.H.; methodology, K.J. and J.H.; writing—original draft preparation, K.J.; writing—review and editing, K.J. and J.H.; supervision, J.H. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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