



Sustainable marketing innovation and consumption: Evidence from cold chain food online retail

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ABSTRACT

As reports on the gap between consumer awareness and behaviors in sustainable consumption increase, the effects of sustainable marketing innovation services on alleviating this gap are attracting more and more attention. This study integrates innovation diffusion theory, perceived value theory, and planned behavior theory to study the impact of online retail food cold chain recyclable express package marketing innovation. Specifically, it explores the antecedents, consequences, and mediating factors of sustainable marketing innovation in guiding consumers to participate in express packaging recycling. Survey data were obtained from 581 individuals in the area of Seoul, South Korea, and they were analyzed using structural equation modeling. This study found that the five innovation diffusion characteristics of sustainable marketing innovation services (comparative advantage, compatibility, complexity, trialability, and observability) each have a significant impact on consumers' participation in express packaging recycling. In addition, consumer's perceived value and satisfaction are effective mediators for promoting consumers' participation in express package recycling. This study enriches the literature on enterprise sustainable marketing innovation services using a theory-driven approach and provides practical insights into the effectiveness of using a marketing innovation service to achieve cleaner production for enterprises.

1. Introduction

A growing number of studies have found a gap between the awareness and behaviors of consumers in the field of sustainable consumption. This gap is also reflected in the fact that groups of online retail consumers of cold chain food products are difficult to convert to take up sustainable consumption behavior even though they are concerned with environmental protection (Stål and Jansson, 2017; Young et al., 2010). To resolve these challenges, it is important to recognize the role of enterprises. In corporate marketing departments, unmet sustainable demand is a market opportunity for enterprises (Widaningrum et al., 2020). In recent years, through sustainable marketing innovation (SMI) services, enterprises begun to provide marketing services that not only meet consumer and enterprise needs but are also conducive to sustainable development (Romani et al., 2016). In fact, even as it aids enterprises in making profit, SMI can provide consumers with more acceptable and optional green services to guide and encourage consumers to participate in sustainable consumption behavior (SCB) (Ferdous, 2010). Moreover, such SMI services are increasingly forming

partnerships with consumers, guiding them to receive services and promoting a shared responsibility to protect the environment (Romani et al., 2016). As a result, enterprises' interest in SMI is increasing rapidly, and surveys show that most companies plan to increase their SMI spending (Tillinghast, 2010). Sustainable development in marketing may be the largest challenge facing enterprise marketing at present (Ferdous, 2010). Studies show that services' functional characteristics remain the main influencing factor in consumers' purchase decisions, while green characteristics seem to have little practical importance (Rokka and Uusitalo, 2008). Consumers also engage with SMI services primarily for their functional value, which makes sustainability attributes only secondary or complementary. If consumers perceive a negative consequence (such as reduced product performance, additional cost, or inconvenience) for participating in SMI services, they will quickly resort to unsustainable alternatives (Luchs et al., 2015). This study aims to determine the determinants that influence enterprise SMI services to promote consumer participation in SCB.

Gaps remain in the existing literature on SMI. First, most previous studies study SMI alone and neglect the structural relationship between

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SMI and consumers' SCB through specific marketing cases (Stål and Jansson, 2017). In addition, although extensive studies have investigated consumer perceptions in sustainable marketing (Ferdous, 2010), few have explored the impact of SMI services on consumer cognition and behavior. Finally, as most studies focus on the design and practice of SMI, little work has been done on the service characteristics of SMI. Furthermore, little research has focused on the role that the characteristics of SMI services play in guiding consumers to participate in an SCB (Fiore et al., 2017). Therefore, we argue that examining the relationship between SMI service characteristics and consumer perception and behavior can clarify the factors that drive SCB practices and establish efficient SMI services.

To make up for the research gaps regarding SMI and SCB, this paper identifies recyclable express package marketing of cold chain food by online retailers as a representative research context and integrates the following three theories to identify the impact of SMI service characteristics on consumer SCB: innovation diffusion theory, perceived value theory, and planned behavior theory. First, according to the diffusion theory of innovation, SMI service should be seen as innovative relative to traditional marketing methods, spreading out over time across certain social channels (Rogers, 2010). Thus, consumer participation in cold chain food recyclable express package marketing services is mainly affected by five factors, namely, relative advantage, compatibility, complexity, trialability, and observability of SMI service (Yuen et al., 2020a). These factors provide antecedent variables for consumers to participate in SMI and implement SCB. Second, perceived value theory holds that consumer perceived value is usually manifested in four aspects: economy, function, hedonism, and social utility. It can be derived from an evaluation of the characteristics of SMI service (Yuen et al., 2020b). Finally, planned behavior theory is most often used to explain consumer adoption behavior, and it provides a basic understanding of most human behavior (Ajzen, 1991). For this theory, attitudes, subjective norms, and perceived behavioral controls predict behavioral intentions. In this study, consumers' attitudes (e.g., perceived value or consumer satisfaction) toward obtaining SMI services are seen as the major factors influencing consumer participation in SCB. If SMI service features provide consumers with superior customer value and shopping satisfaction while promoting consumers' participation in express package recycling (EPR), then consumers have stronger behavioral intention to participate in SCB (Wang et al., 2004). In summary, our study takes a theory-driven approach, in distinction from previous work. This study elaborates on the integration of the three theories that support this view. The three theories are both independent and mutually influencing, creating a unique perspective for theoretical research on SMI's influence on consumers' participation in SCB. In particular, the applied theories related to innovation diffusion paradigm have not been given much

attention in the field of marketing innovation.

The remainder of this study is arranged as follows. First, a literature review is conducted, and a theoretical model is constructed. Thereafter, we collect data and employ structural equation modeling (SEM) to test the proposed hypotheses. Next, analysis results are described and discussed. The final section draws detailed conclusions.

2. Literature review

2.1. Recyclable express package

Building upon the investigation of the Korea market, SMI in this study is defined as an innovative marketing service in which cold chain online retailers use recyclable express packaging to guide consumer engagement with the entire process of EPR. In fact, the core goal of cold chain food recyclable express packaging (Fig. 1.) is to avoid doing harm to the ecological environment (Hao et al., 2019). The core flow chart of SMI service for cold chain food recyclable express packaging is shown below (Fig. 2). Specifically, online retailers use recyclable express packaging to deliver cold-chain food ordered by consumers to their homes, while also using SMI services of recyclable express packaging to vertically differentiate their products and services. Furthermore, in the reverse logistics of EPR, online retailers establish partnerships with consumers to guide them to place express packages in front of their homes before the arrival of the next order to allow delivery personnel to collect them (Ding et al., 2021). The key element of an SMI service is reverse recycling, where the consumer is the starting point for the logistics (Kumar, 2019). Therefore, it is necessary for consumers to participate in SMI services. In fact, consumer participation is an important concept in marketing research (Brodie et al., 2011). In South Korea, retailers innovatively use EPR based SMI services for contactless delivery in the fulfillment of consumer demand for cold chain food and guide them to participate in EPR. It is worth noting that EPR is an important part of sustainable consumption behavior. It not only saves operating costs for retailers but also meets consumers' environmental protection needs and promotes the effective utilization of underutilized resources (Y. Wang et al., 2019). This SMI service not only brings benefits to consumers, but also contributes to the sustainable development of the cold chain food retail industry. Although the cold chain express package model has been popular among consumers, the internal mechanisms of SMI services, whereby consumer participation in EPR is encouraged, is unclear. We believe that understanding the value proposition of cold chain food online retailers' SMI services may fill a gap in SMI services through promoting consumer participation in SCB research.



Fig. 1. Cold chain food recyclable express packaging
Source: <https://news.coupang.com/archives/5921>.

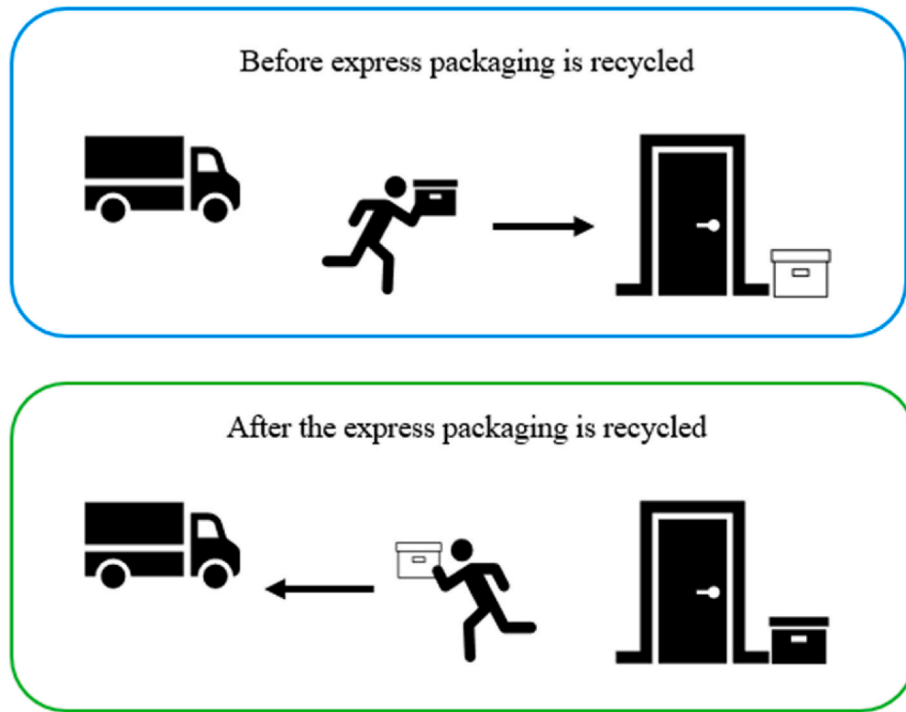


Fig. 2. Consumer participation in the package recycling process.

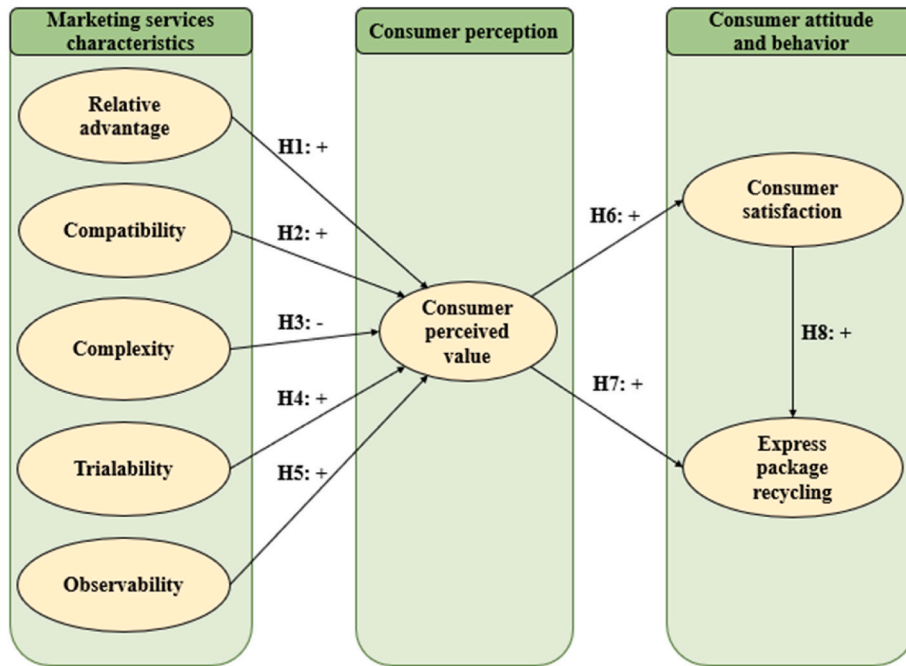


Fig. 3. The theoretical model.

2.2. Theories and hypotheses

This study investigates how online retailers guide and promote consumer participation in EPR through SMI services with the characteristics of innovation diffusion. We integrate innovation diffusion theory, perceived value theory, and the theory of planned behavior to put forward a theoretical model and the hypothesis of this study (Fig. 3).

2.2.1. Innovation diffusion characteristics of sustainable marketing

Perceived value theory suggests that the success of innovation services is based on the specific value that consumers perceive in their participation in services. Consumers mainly reflect the value of services in terms of economic (e.g., price), functional (e.g., quality or performance), emotional (e.g., feeling and emotion), and social (e.g., self-concept) utility (Su et al., 2021). Although perceived value theory supports the recognition criteria of perceived value in four ways aspects,

it does not explain the source of perceived value much. Consumers usually obtain perceived value by evaluating service characteristics services, while innovation diffusion theory provides the key innovation characteristics to consumers to evaluate their participation in SMI services. Therefore, it is necessary to explore the characteristics of SMI services based on the innovation diffusion theory. Innovation diffusion theory describes how an innovation or technology is accepted and begins to spread in societies both large and small (Rogers, 2010). This theory was developed to explain why individuals choose to accept or reject innovations based on their beliefs (Yuen et al., 2020a). In addition, the innovation diffusion theory also focuses specifically on the process of individual adoption of innovation. It is the decision-making process of an individual or organization deciding whether to adopt an innovation, new service, or product. The decision-making process consists of five consecutive stages. Correspondingly, they are the stages of “knowledge, persuasion, decision-making, execution, and confirmation” (Rogers, 2010).

This theory can be applied to the background of this research because the marketing innovation of cold-chain food online retailers’ recyclable express packaging can be considered as an innovation that completely changes the consumer’s SCB. The innovation diffusion theory emphasizes the essential attributes of innovation. More specifically, this theory proposes a comprehensive set of consumer beliefs (the perceived characteristics of innovation, i.e., relative advantage, compatibility, complexity, observability, and testability); these beliefs directly affect the results of technology acceptance (Rogers, 2010). In this study, the SMI characteristics provided by the innovation diffusion theory are rationalized, which increases consumers’ perceived value of SMI services (i.e., H1-H5), thereby deepening the transformation of sustainable consumption behavior.

Relative advantage describes how far the SMI services associated with delivery packages are perceived as better than alternative services. As online shopping continues to grow, non-recyclable express packages usually entail much packaging waste, which can be expensive to deal with. The reuse of recyclable express packages eliminates the generation of packaging waste, meets the environmental protection needs of consumers, and increases economic and social value for consumers (Arnaud, 2017). In addition, recyclable packaging is often made of better functional materials, ensuring the safety of the food. Thus, it can reassure consumers, leading to their functional and emotional utility (Hao et al., 2019).

Compatibility refers to the degree to which an SMI service is consistent with a consumer’s lifestyle, values, past experiences, and needs (Rogers, 2010). As environmental education spreads, active consumers are focusing more on their ideals, progress, aspirations, and achievements and thus pursuing positive SMI services (Kammerlander et al., 2015). These individuals tend to match the value and significance of EPR processes to their own values and standards, bringing them to pay more attention to the positive effects of waste recycling behavior and developing more willingness to create a green and healthy living environment (Chen et al., 2019). This demonstrates that SMI services provide consumers with social and emotional value.

Complexity describes the ease with which consumers perceive SMI services to guide them to participate in EPR (Rogers, 2010). In conventional cold chain retailing settings, consumers are not obligated to engage in the disposal of express packaging or the delivery in the reverse logistics of EPR, and the end-to-end retailing process finishes when goods have been delivered to customers (an exception here can be the return of items, which is not the focus of this study) (Gefen et al., 2003). However, in the context of SMI services, we argue that the complexity perceived by consumers may arise from the opportunity and response costs of adopting EPR based services for SMIs. First, participation in EPR requires the consumer to place the package at the retailer’s designated spot with a given time span (Lee et al., 2017), which has made the consumer become a key node in the end-to-end retailing process. From the consumers’ perspective, the role shift from “service recipients” to

“extended assister” entails extra efforts and opportunity costs, making them feel that participating in SMI services may be inherently burdensome and complicated. Furthermore, another contributor to consumers’ perceived complexity may be the response costs of participating in EPR due to channel limitations. Similar to many other firm-level environmental initiatives (Dong et al., 2019; Xie et al., 2019), consumers need to pay for such “green” services. Numerous studies also have shown that complexity is a critical factor in determining consumer perception toward technology and innovation, with the dominant view suggesting a negative association between complexity and consumer attitudes (e.g., Wang et al., 2021; Yuen et al., 2018).

Trialability describes how far consumers can easily try or test SMI services before formally participating (Lee et al., 2011). Following growth in sustainable development, the price of recyclable express packages increased significantly due to their use of expensive materials, and consumers must pay for the spillover price of the express package (Stål and Jansson, 2017). This may raise the threshold for the average consumer to participate tentatively in PER. If the trial involves more time, energy, and expense, consumers may further reduce their willingness to participate in an SMI (Miao et al., 2018). Thus, adequate experimentation provides both functional and emotional value to consumers.

Observability is the degree to which an SMI service can be easily observed and described to others (Wang et al., 2018b). Role models promote interactive imitation and learning potential. That is to say, conformity leads to the generation of EPR behavior and promotes the dissemination of SMI value in a consumer society. If consumers are aware that individuals participate in actions to protect the environment and observe the detailed process and results of EPR, their function and social utility may be improved, increasing their enthusiasm to participate in the SCB (Wang et al., 2021).

Therefore, we propose the following hypotheses:

- H1.** The relative advantage of SMI services positively influences the perceived value of consumers.
- H2.** The compatibility of SMI services with consumers positively affects the perceived value of consumers.
- H3.** The complexity of SMI services negatively affects perceived value.
- H4.** The trialability of SMI services positively affects perceived value.
- H5.** The observability of SMI services positively influences perceived value.

2.2.2. Consumer attitudes and behaviors

Research on consumer attitudes mainly involves the perceived value theory, which is concerned with consumers’ overall assessment of the utility of products or services (Su et al., 2021). It theorizes that products or services with higher value in the market choice will motivate people to continue to use them, and even change past consumer behaviors (Yuen et al., 2020b). Therefore, the success of SMI services will also be based on the specific values that consumers perceive in participating in SMI services. In addition, satisfaction has been regarded as the most important concept and goal in marketing (Wang et al., 2004). Satisfaction is also considered to be the most important factor affecting consumer’s active post-purchase behaviors (e.g., PER) (Wang et al., 2016). Like other widely studied marketing concepts, perceived value and satisfaction are also important components of consumer attitude research (Su et al., 2021). The complex relationship between them and innovative marketing services has always been controversial. Combined with the application of perceived value theory in consumer satisfaction research, we conclude that satisfaction has a similar meaning to the perceived value that consumers obtain from services to a certain extent (Yuen et al., 2020b). This comes from consumers’ emotional response to service experience and perceived value judgments (Yoo and Park, 2016). Therefore, we believe that managing SMI services and improving

perceived value can increase consumer satisfaction.

H6. The higher CPV provided by SMI services positively affects satisfaction.

To explore the impact of the two attitudes of satisfaction and perceived value on EPR behavior, we draw on the perspective of planned behavior theory. Planned behavior theory explains consumer adoption behavior, namely, human intentions and behaviors in a specific context (Ajzen, 1991). Planned behavior theory takes the individual's own wishes and the external environment as the analysis unit and proposes three determinants of consumer behavior, 1) attitude, 2) subjective norms, and 3) perceived behavior control (Ajzen, 1991). These indicators respectively represent the emotional tendency of the target behavior, the perception of social pressure and the judgment of the consumer's own control ability. According to planned behavior theory, human behavior is planned, and EPR intentions are determined by consumers' attitudes (Ajzen, 1991). Combined with perceived value theory, the emotional tendency of the supporting attitude comes from the overall evaluation of the service (i.e., satisfaction and perceived value) after the consumer participates in the SMI service (Hao et al., 2019). According to the above two theoretical viewpoints, we believe that perceived value and satisfaction as the two positive attitudes in marketing research are important predictors that affect consumers' EPR decision-making (Wang et al., 2021). Therefore, we have the following hypotheses:

H7. Higher satisfaction actively engages consumers in EPR.

H8. Higher perceived value positively influences consumers' participation in EPR.

3. Methodology

3.1. Research design

This study first developed measurements for the structural model with reference to the literature to make each concept operable (Table 1). Measurement items were developed to represent specific research context of SMI services on the scale. Next, experimental scenarios for an SMI service were embedded in the questionnaire to collect data from consumers in Seoul, South Korea. Scenario-based studies were chosen here to compensate for various deficiencies in retrospective self-report methods, such as memory failures and rationalizations (Dong et al., 2008). Prior to data collection, we conducted online interviews with logistics experts and academics. These interviews ensured that the developed indicators and questionnaires truly reflected the content of the study and that all relevant but overlooked indicators would be included in the study. After data collection, the SEM was used as a data analysis method to test the theoretical model. The rest of this chapter elaborates the study design in detail and summarizes the sample statistics.

Table 1
Constructs and measurement items.

Construct	Measurement items	Source
Relative advantage (RAD)	From 1 = <i>strongly disagree</i> to 7 = <i>strongly agree</i> RAD1: SMI service solves the environmental problems of traditional express package. RAD2: SMI service reduces the time I spend dealing with express packaging waste. RAD3: SMI service is more convenient than the traditional express package processing process. RAD4*: SMI service has advantages over other express package recycling services. RAD5: SMI service has improved my experience with EPR.	Petschnig et al. (2014); Wang et al., 2018
Compatibility (CPA)	From 1 = <i>strongly disagree</i> to 7 = <i>strongly agree</i> CPA1: SMI Service is consistent with my environmental beliefs. CPA2: SMI Service fits my recycling habits. CPA3: SMI Service meets my green consumption needs. CPA4: SMI Service fits well into my daily life.	Yuen et al. (2020b); Wang et al., 2018
Complexity (COM)	From 1 = <i>strongly disagree</i> to 7 = <i>strongly agree</i> COM1: Learning to participate in SMI services is complex. COM2: The EPR process for implementing SMI service boot is complex. COM3: Implementing the EPR process for SMI service bootstrapping is cumbersome. COM4: It takes a lot of effort to complete the EPR process guided by the SMI service.	Petschnig et al. (2014); Wang et al., 2018
Trialability (TRI)	From 1 = <i>strongly disagree</i> to 7 = <i>strongly agree</i> TRI1: I can easily participate in SMI services TRI2: I know where I can participate in the SMI service TRI3: I can experiment with the SMI service if necessary TRI4*: The SMI service is open to me to do the necessary experimentation.	Petschnig et al. (2014); Wang et al., 2018
Observability (OBI)	From 1 = <i>strongly disagree</i> to 7 = <i>strongly agree</i> OBI1: I can learn to participate in SMI service requirements. OBI2: I can easily tell someone how to participate in SMI services. OBI3: I believe I can benefit from participating in SMI services. OBI4*: I can communicate to others the benefits of participating in SMI services.	Meuter et al. (2005); Wang et al., 2018
Consumer perceived value (CPV)	From 1 = <i>strongly disagree</i> to 7 = <i>strongly agree</i> CPV1: SMI service meets my shopping needs. CPV2: SMI service can save my cost. CPV3: SMI service makes me feel good. CPV4*: Participation in SMI services will have a positive impact on the environment and society.	Yuen et al. (2020b)
Consumer satisfaction (SAT)	From 1 = <i>strongly disagree</i> to 7 = <i>strongly agree</i> SAT1: The overall service of online retailers has exceeded my expectations. SAT2: I am satisfied with the overall service of the online retailers. SAT3: The online retailer's service is my ideal service.	Yuen et al. (2016)
Express package recycling (EPR)	From 1 = <i>strongly disagree</i> to 7 = <i>strongly agree</i> EPR1: I am always trying cold chain food new EPR. EPR2: I always stick to cold chain food EPR. EPR3: I have started to recommend cold chain food EPR to others. EPR4*: I motivate to do cold chain food EPR. EPR5: I will cooperate more with cold chain food EPR	Wang et al. (2021); Kumar (2019)

Note: *Items dropped from further analysis due to cross loading or low factor loading.

3.2. Survey design and data collection

The questionnaire consisted of three parts. The first provided information on the background, significance, and objectives of the research. The second part collected demographic information on the respondents, such as their age, gender, annual income, education level, and nationality. All of the respondents were participants in an SMI service with recyclable express packaging. After this, the subjects were asked to evaluate the SMI service, as well as their own perceived value, satisfaction, and EPR. To make the data analysis of the questionnaire operable, we adopted a 7-point Likert scale for each item, setting the anchors at “strongly disagree” (1) and “strongly agree” (7). In addition, to ensure the quality of the data collection, the questionnaire also included a method of reverse measurement. Questionnaires were collected from residents in Seoul, South Korea, who had used online retail services for cold chain food. Moreover, to verify whether the nationality of consumers has an impact on SCB under the guidance of SMI service, this study also conducted a questionnaire survey on a part of Chinese consumers living in Seoul, South Korea, who used SMI service for EPR behavior. The English version of the questionnaire was first translated into Korean and Chinese and then reverse-translated by the survey members into English to ensure readability and equivalent meaning of the questionnaires in both languages. All language versions were checked to rule out any discrepancies or misunderstandings. Finally, the completed survey was sent to participants by a professional questionnaire survey agency in Korea. Data were collected from January 15 to March 15, 2021.

3.3. Demographics of respondents

By March 15, 2021, a total of 581 valid questionnaires had been received, not including invalid questionnaires. Each questionnaire took about 6 min to complete, which indirectly guaranteed the quality of the data. We took February 1 as an arbitrary cut-off point, divided the replies received into early and late replies, and carried out a *t*-test on the mean difference value for each item to verify that the replies of the subjects had no significant difference between the groups. Sample distribution statistics are shown in Table 2.

Table 2
Demographic profile.

Items	Category	Frequency	Percentage (%)
Gender	Male	298	51.29
	Female	283	48.71
Age (years)	< 20	28	4.82
	20–29	152	26.16
	30–39	243	41.82
	40–49	119	20.48
	> 50	39	6.71
Nationality	China	174	29.95
	South Korea	407	70.05
Education	High school or below	89	15.32
	Diploma	301	51.81
	Bachelor	152	26.16
	Postgraduate or above	39	6.71
Annual income (million KRW) (1 million KRW = 900.09 USD*)	< 24	205	35.28
	24–47.99	208	35.80
	48–71.99	123	21.17
	> 72	65	11.19
N = 581			

Note: * South Korean Won to US dollar conversion was last updated Jun 06, 2021, 08:27 UTC.

4. Results

4.1. Measurement model analysis

It should be noted that if the sample data falls on a multivariate normal distribution, the maximum likelihood method can be used (Browne, 1984). Therefore, the normality of the data were tested before the maximum likelihood method can be used to estimate SEM. CFA of the structural model showed the absolute value of skewness The kurtosis of the observed variables was less than 2, so the observed variables in this study had a normal distribution (Raykov and Marcoulides, 2008). After the normality test, we performed CFA to determine the fitness of the measurement model (Table 3). The results showed that the models were well fitted to the data (Note: model fit indices: $\chi^2/df = 1.99$, $p < 0.05$, $df = 315$, CFI = 0.96; TLI = 0.95; RMSEA = 0.05; SRMR = 0.05). In addition, we also evaluate the reliability, convergence validity, and discriminant validity of the measurement model. According to Table 3, after deleting the items with lower load factors, the factor load and overall reliability of the measured items were greater than the recommended values of 0.70 and 0.80 (Hair et al., 2010). This shows that all measurements were reliable. As shown in Table 4, convergence effectiveness is established when the mean variance of each structure

Table 3
Results of confirmatory factor analysis.

Construct	Item	λ	AVE	CR
Relative advantage (RAD)	RAD1	0.89	0.71	0.91
	RAD2	0.95		
	RAD3	0.77		
	RAD5	0.75		
	CPA1	0.91		
Compatibility (CPA)	CPA2	0.96	0.80	0.94
	CPA3	0.84		
	CPA4	0.86		
	COM1	0.76		
Complexity (COM)	COM2	0.82	0.76	0.92
	COM3	0.96		
	COM4	0.92		
	TRI1	0.77		
Triability (TRI)	TRI2	0.80	0.60	0.82
	TRI3	0.75		
	OBI1	0.77		
Observability (OBI)	OBI2	0.88	0.69	0.87
	OBI3	0.83		
	CPV1	0.76		
Consumer perceived value (CPV)	CPV2	0.93	0.71	0.88
	CPV3	0.82		
	SAT1	0.82		
Consumer satisfaction (SAT)	SAT2	0.89	0.66	0.85
	SAT3	0.71		
	EPR1	0.78		
Express package recycling (EPR)	EPR2	0.73	0.56	0.84
	EPR3	0.75		
	EPR4	0.74		
	EPR5	0.74		

Note: Model fit indices: $\chi^2/df = 1.99$, ($p < 0.05$, $df = 315$); CFI = 0.96; TLI = 0.95; RMSEA = 0.05; SRMR = 0.05.

Table 4
Square roots of AVE and correlations of the constructs.

	RAD	CPA	COM	TRI	OBI	CPV	SAT	EPR
RAD	0.84 ^a							
CPA	0.18 ^b	0.89						
COM	−0.12	−0.43	0.87					
TRI	0.25	0.48	−0.64	0.77				
OBI	0.22	0.12	−0.19	0.29	0.83			
CPV	0.25	0.48	−0.64	0.54	0.30	0.84		
SAT	0.12	0.24	−0.26	0.21	0.21	0.44	0.81	
EPR	0.21	0.27	−0.35	0.36	0.29	0.53	0.70	0.75

^a Square root of AVE values are along the main diagonal.

^b Correlations of constructs are below the main diagonal.

extracted is higher than the recommended value of 0.50 (Hair et al., 2010). However, because all constructs were measured simultaneously using the questionnaire tool, the results may be susceptible to common method bias. In addition to encouraging respondents to answer as honestly as possible, we used a univariate model to perform CFA on 12 measurement items. Since the results show that the model fit was much worse than the measurement model, common method bias was probably not an issue.

4.2. Structural model analysis

Structural model analysis enables us to test the hypotheses of the confirmatory study, supported by the results of the CFA of the measurement model. The final fitting results of the structural model are shown in Fig. 2. All fit indexes ($\chi^2/df = 2.07$, $p < 0.05$, CFI = 0.94; TLI = 0.93; RMSEA = 0.05; SRMR = 0.07) showed good fit (Hair et al., 2010). We added control variables, including nationality, education, and income, to the model to illustrate their impact on participation in the SMI service implementation of EPR. As indicated in Fig. 2, we regressed the structural model in terms of the control variables. The standardized regression estimates for the control variables nationality, education, and income were 0.01, 0.05, and 0.03. The effects of these control variables were not significant. This unexpected discovery has implications for us. First, in the same specific marketing scenario, online retailers guide consumers to participate in the EPR process through SMI services, irrespective of nationality. Regardless of whether the consumers are from a developing or a developed country, the effect of mass participation in SCB was the same for the same SMI service situation. Second, previous studies have shown that consumers with higher education levels and higher incomes have stronger SCB (Costa Pinto et al., 2014). In the specific SMI service environment examined in this study, the effects of income and education appeared offset. In contrast to the control variables, the SMI service characteristics of the online retailer have a

more decisive effect on consumer EPR. These characteristics include comparative advantage, compatibility, complexity, testability, and observability. Their standardized effects were 0.09, 0.23, -0.44, 0.30, and 0.11, respectively. Therefore, H1, H2, H3, H4, and H5 were accepted (Hair et al., 2010). Together with the control variables, these five variables accounted for 51% of the perceived value difference ($R^2 = 0.51$). The research results were consistent with the theoretical viewpoint of this study.

Fig. 4 also showed that consumer perceived value had a significant positive effect on consumers' EPR behavior ($\beta = 0.28$, $p < 0.05$). At the same time, consumer perceived value had a significant positive effect on satisfaction ($\beta = 0.42$, $p < 0.05$), and satisfaction had a significant positive effect on consumer participation in EPR behavior ($\beta = 0.58$, $p < 0.05$), so H6, H7, and H8 were accepted. Moreover, the theoretically driven structural model explains a 55% difference in consumer participation in EPR. This suggests that the combination of various theories in this study provides a unique perspective with a better explanatory effect for theoretical research on SMI services in promoting consumer participation in SCB, which leads to better theoretical integration or unification.

4.3. Direct, indirect, and total effect analysis

To verify the mediation mechanisms between online retailer SMI and consumer EPR, we used the bootstrap method (Table 5). Satisfaction partly mediated the positive effect of consumer perceived value on consumer EPR, and perceived value fully mediated the impact of five SMI service characteristics on consumers' participation in EPR. As shown in Fig. 4, all exogenous variables have a significant total impact on consumer EPR. Among all the factors that affect consumers' participation in EPR, satisfaction ($c_{73} = 0.58$) had the largest overall impact, followed by perceived value ($c_{63} = 0.52$). This also illustrates the importance of consumers' overall satisfaction during shopping and the

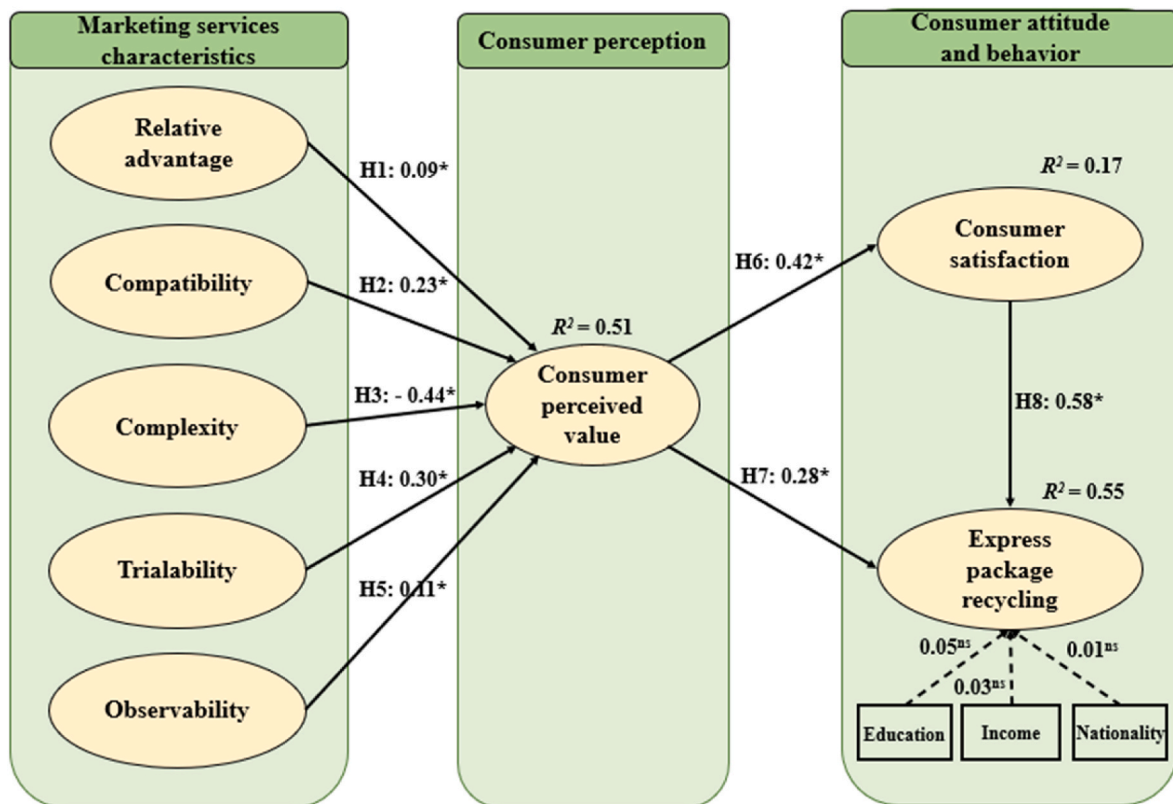


Fig. 4. Parameter estimation of the proposed model.

Note: $\chi^2/df = 2.07$, $p < 0.05$, CFI = 0.94; TLI = 0.93; RMSEA = 0.05; SRMR = 0.07.

Table 5
Direct, indirect, and total effects.

Exogenous (i)	Endogenous (j)		
	CPV (1)	SAT (2)	EPR (3)
Direct effect (a_{ij}) of ...			
RAD (1)	0.09	–	
CPA (2)	0.23	–	
COM (3)	–0.44	–	
TRI (4)	0.30	–	
OBI (5)	0.11	–	
CPV (6)	–	0.42	0.28
SAT (7)	–	–	0.58
Indirect effect (b_{ij}) of ...			
RAD (1)	–	0.04	0.04
CPA (2)	–	0.10	0.12
COM (3)	–	–0.18	–0.23
TRI (4)	–	0.13	0.16
OBI (5)	–	0.05	0.06
CPV (6)	–	–	0.24
SAT (7)	–	–	–
Total effects (c_{ij}) of ...			
RAD (1)	0.09	0.04	0.04
CPA (2)	0.23	0.10	0.12
COM (3)	–0.44	–0.18	–0.23
TRI (4)	0.30	0.13	0.16
OBS (5)	0.11	0.05	0.06
CPV (6)	–	0.42	0.52
SAT (7)	–	–	0.58

perceived value of participating in SMI services. It is worth noting that although the five innovative features of SMI services have a significant overall impact on consumer participation in EPR, the magnitude of the overall impact of each feature is different. Among them, the most influential is complexity ($c_{33} = 0.23$), followed by trialability ($c_{43} = 0.16$). The order of influence of the remaining three factors is compatibility ($c_{23} = 0.12$), observability ($c_{53} = 0.06$), and relative advantage ($c_{13} = 0.04$). The results also show that when paying attention to the effectiveness of SMI services, the innovative characteristics of each SMI service have a different impact on the effect of the service.

5. Discussion

5.1. Theoretical contribution

This research has certain implications for the field of marketing innovation and sustainable consumption in terms of theory and management. First, the theoretical understanding of SMI in enabling consumers to make SCB decisions was deepened. Specifically, taking the online retail of cold chain food recyclable express package marketing as an example, the internal mechanisms by which enterprises to guide consumers to participate in EPR through marketing innovation service characteristics were explored. This fills a research gap in the field of sustainable marketing and sustainable consumption. Existing research focuses on the conceptual study of sustainable marketing rather than on the understanding of the driving effects of SMI service characteristics on consumer SCB (Ferdous, 2010). Our study confirmed existing conceptions indicate that the determinants of SCB also come from SMI service design and characteristics (Luchs et al., 2015). In fact, while the sustainable development goals are being approached, consumers still lack the necessary motivation, the opportunity, and ability to change their unsustainable consumption behaviors (Rokka and Uusitalo, 2008). The results of this study suggest that through SMI, sustainable products and services can be brought to market as new options for consumers, leaving the power of SCB in their hands, prompting consumers to take a step toward sustainability goals.

Second, this study widens the field of recycling research. As the need for sustainable development in the online retail industry deepens, recyclable express packaging has been considered as a promising

solution to the dilemma between economic growth and ecological development. While the literature to describes consume engagement with SMI by focusing on the design and relevant psychological effects of the express package (e.g., material and form) (Ding et al., 2021), we demonstrate that when marketing is applied responsibly, effective intervention in waste collection and recycling activities beginning at the source of the waste, i.e., guiding individuals to participate in waste recycling behavior, is a basic premise for ensuring effective recycling. It likewise determines whether the process of waste resource management and recycling can be effectively implemented (Chen et al., 2019). Although EPR has been applied in a few places, there is no theoretical framework for promoting consumer participation in EPR. This study not only provides the characteristics of SMI services that attract consumers to participate in EPR in theory but also makes specific recommendations in the management guidance section to encourage consumers to participate in EPR. This research bridges a knowledge gap in the realm of innovative marketing and consumer interaction.

Finally, this study further developed integration theory. Introducing and integrating innovation diffusion theory, perceived value theory, and planned behavior theory, this paper investigated the influence of enterprise SMI service on consumers' SCB decisions with a theory-driven approach and an advanced theoretical study of sustainable marketing. The three theories used come from different paradigms: social communication, customer value, and social psychology. Innovation diffusion theory supplements the SMI research model with specific beliefs about innovation and further advocates the significant and complex relationship between SMI service characteristics and SCB (Wang et al., 2018b). This research identifies, proposes and conceptualizes the elements of SMI services to guide consumers to participate in SCB. It also validates the view of the perceived value theory that customers are also evaluating a company's contribution to the environment and society when consuming (Yuen et al., 2016). Perceived and true consumer value can predict consumer attitudes and behaviors after purchase. This provides a solid theoretical foundation for building an effective SMI service value (Chi and Kilduff, 2011). Finally, we indicate that attitude is an important predictor of behavioral intention (Wang et al., 2021). We prove once again that consumers' perception of service will encourage consumers to take more active environmental behaviors. This enriches the literature of planned behavior theory.

5.2. Practical implication

Our results provide valuable insights from a management and policy perspective. First, online retailers should be aware that consumers' overall satisfaction with online shopping directly affects their participation in SCB. When core functional needs are not met, consumers often neglect to participate in SCB. This requires enterprises to focus on meeting consumers' overall shopping needs while practicing sustainable marketing innovation, attaching importance to the essence of products or services and providing customers with the satisfaction of the overall shopping experience rather than sacrificing functional features for social and environmental sustainability. Increasing consumer happiness and satisfaction with more ideal products and services in order to encourage consumers to use SMI services.

At the same time, although satisfaction is a necessary condition for SMI to guide consumers to participate in SCB, it is not sufficient. This study determined that in the SMI context, the more that consumers agree with the value proposition of the retailer's SMI service features, the stronger the participation in the SCB. For each retail innovation marketing intervention, consumers' actual participation in sustainable consumption depends on their perception of the characteristics of retail marketing innovation. In other words, better perceived value of service features has a positive impact on consumers' environmental behavior. In addition, customers are no longer passive receivers of service delivery but active co-creators of service value. Therefore, to encourage consumers to participate in EPR-based SMI services, businesses should

emphasize the perceived value of SMI services from four perspectives: economic, functional, emotional, and social. To begin with, businesses should give as many discounts or point activities as feasible to reduce the cost of consumers paying for SMI services. Conducting various monetary reward actions for consumers who use SMI services in order to deliver economic value to consumers. Second, utilize advertising and other marketing channels to promote the functional value of SMI services. Thirdly, businesses should prioritize customer relationship management with consumers and constantly remind them of the critical importance of environmental protection actions such as SMI services. Maintaining a strong emotional and social value resonance with customers over their attitudes toward environmental protection.

When designing marketing strategies, managers must establish a careful balance between the asymmetry of consumer knowledge and related learning costs to ensure the formation of a virtuous learning cycle in the co-creation relationship (Wang et al., 2018a). Therefore, we also strongly advocate enterprises focus on the service attributes of SMI (comparative advantage, compatibility, complexity, testability, and observability). Specifically, first, SMI services should have a higher relative advantage over other services in the market. The focus should fall on improving product performance and reducing the additional cost of consumer participation. Second, greater testability means that consumers have lower levels of uncertainty when deciding whether to adopt an innovation. Enterprises can assist consumers to learn through trial and error by expanding and strengthening the availability of a free trial of SMI services. Assuring that users have a positive experience with the service during the initial trial period. Moreover, enterprises can use as many mass media channels as possible to guide consumers to observe the positive results and processes of participating in SMI services. In addition, it is necessary that enterprises undertake regular customer demand surveys and analysis of client wants. Integrating consumers' beliefs and lifestyles into sustainable marketing innovation services in order to deliver SMI offerings that are consumer-compatible.

Finally, managers need to be aware of a simplified SMI service process that provides easy-to-follow steps and avoids cumbersome participation activities. Most importantly, SMI services are not a panacea and can cause unintended harm or rebound effects if not monitored properly (Hertwich, 2005). Therefore, the government sector should have coherent policies for sustainable production and consumption that goes beyond green advice for enterprises and consumers (Young et al., 2010). For instance, during pandemics, the government should collaborate with businesses on epidemic prevention. Governments might advocate for and provide monetary awards to encourage consumers to use EPR-based SMI services to acquire cold chain agri-food, thus reducing outbreak transmission and shaping the consumer's SCB. In addition, sustainable change requires that people have time and space in their lives that may not be available in their increasingly busy lifestyles. Policymakers, communities, regulators, and legislators should adopt new policies to support individuals and businesses in implementing SMI. They should take action to change consumers' social values by providing education and support programs and intervening with businesses to shape consumer choices for the greater public good. Enterprises are encouraged to improve their services and practices toward SMI characteristics to accomplish consumer SCB transformation (Gordon et al., 2011).

6. Conclusion

This study argues that SMI services provide a new practical approach for consumers to accomplish SCB changes in the contemporary sustainable development. This method is not mandatory but takes consumer perception and behavioral characteristics into full consideration in creating marketing innovations to allow consumers to complete a transformation of sustainable consumption (Ding et al., 2021). Using specific cases, this study examines the process of online retailers guiding consumers to recover cold chain food express packaging as an SMI

service and discusses the factors of SMI affecting consumer participation in EPR. This study discussed the relationship between these factors from a theoretical perspective and further conceptualized the decision-making process of consumers around innovation attributes, perceived values, and attitudes.

This research not only enriches the theoretical research on marketing innovation but also has reference significance for marketing managers to establish effective marketing services. Regrettably, this study has certain limitations. First, it chooses a case of recyclable express package to discuss the role of enterprise SMI service characteristics in influencing consumers' SCB decisions. This particular scenario may limit the broader application of the findings presented in this study. Therefore, we invite scholars to expand our research in a wider range of marketing contexts across different industries. Second, the study was conducted in Seoul, the capital of South Korea, a developed, densely populated country with a high level of education. Consumers in this region may be more aware of the benefits of sustainable consumption, which may affect the generality of the findings. Another limitation of this study is that we used only a limited number of theoretical perspectives to ground our discussion. We invite scholars to conduct similar research with other theories, explore the nuances of SMI.

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CRedit authorship contribution statement

Miao Su: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Mingjie Fang:** Software, Formal analysis, Writing – review & editing. **Junseung Kim:** Investigation, Resources, Data curation. **Keun-sik Park:** Funding acquisition, Project administration, Investigation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Abbreviations used in this study

SMI	Sustainable marketing innovation
SCB	Sustainable consumption behavior
EPR	Express package recycling

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