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Understanding Customer Preferences of Delivery Services for Online Grocery Retailing in South Korea

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Abstract: With the rapid growth of online grocery shopping in South Korea, e-grocery retailers have faced intense competition. Consequently, they attempt to differentiate themselves by offering diversified delivery services, such as providing early morning delivery services or eco-friendly packaging. The purpose of this paper is to analyze consumer preferences with regards to delivery services with different delivery times and packaging types targeting South Korea's online grocery markets. Specifically, six delivery types consisting of combinations of two delivery time options (dawn, daytime) and three packaging types (paper box, market cooler bag, personal icebox) are examined. A survey was conducted in July 2020 with 218 consumers who regularly buy fresh food online. The collected data were analyzed by means of a conjoint analysis and ANOVA. The present study finds that customers most strongly prefer dawn delivery using a personal icebox, followed by dawn delivery using a market cooler bag, with daytime delivery using a paper box being the least preferable. Furthermore, consumers value the packaging type more than the delivery time when selecting a delivery service. Lastly, the preferences of consumers regarding delivery service types differ according to their characteristics. This study is expected to contribute to the establishment of a delivery strategy for online grocery companies.

Keywords: delivery time; packaging type; dawn delivery; eco-friendly packaging; conjoint analysis

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1. Introduction

Online grocery markets have been growing rapidly since the COVID-19 outbreak. During the peak of the pandemic at the end of 2020, the online penetration rate in the grocery market saw a threefold increase on pre-pandemic levels [1]. South Korea's online grocery markets also expanded dramatically during this period. According to Statistics Korea, the online food markets grew 2.5 times from 2019 to 2021, with 81.5% of all customers having purchased groceries online [2].

As the online grocery market in South Korea has rapidly expanded, many major retailers such as Coupang, Emart Mall and Market Kurly are fiercely competing to increase their market share. Typically, they focus on providing high-quality delivery services to their customers to strengthen their competitiveness. Mckinsey&Company (New York, NY, USA) reports that the variety of delivery options and the perceived quality of the delivery service are major decision-making criteria for online customers [3]. Though there are many other factors, such as product quality, product diversity and price, these factors do not differ much among major retailers [4]. For e-grocery delivery, the delivery time and packaging are considered more important than the other categories of the products, as groceries are a daily necessity that are consumed every day and that have a short shelf life and freshness window [5]. For these reasons, rapid delivery is important. Additionally, the freshness of the groceries is sensitively affected by the temperature, meaning that proper temperature control during the delivery process via a cold-chain system and proper distribution packaging is important.

Therefore, many delivery service options with different delivery times and/or packaging types have been introduced in online grocery retailing to deliver food freshly and promptly. In other words, delivery service types in online grocery shopping have diversified more than that of other product categories where, in most cases, products are delivered in paper boxes in the daytime. For this reason, this paper focuses on the various delivery service types of online grocery retailing.

Regarding delivery time differentiation, early morning delivery service, also known as "dawn delivery", has become a mainstream service in large cities such as Seoul and in the dense Gyeonggi-do area of South Korea [6]. Dawn delivery is a type of rapid delivery service where customers can place orders before midnight with delivery guaranteed by 7 a.m. the next day [7]. This service was rolled out by the e-commerce company Market Kurly and has since been widely adopted. The size of the early morning delivery market was 800 billion won in 2019; however, it has grown more than tenfold to approximately 9 trillion won as of 2022. In the case of daytime delivery, products are transported from 10 a.m. to 9 p.m., with several smaller time slots at intervals of three to four hours. For example, customers can select a preferred time slot, such as 2 p.m. to 5 p.m., for the delivery of their products. Some companies, such as Emart Mall, provide both dawn and daytime delivery services, while others, such as Market Kurly, offer only one delivery type.

In addition to delivery time differentiation, distribution packaging types have also diversified. Packaging can be broadly divided into the two categories of 'product packaging' and 'distribution packaging'. Product packaging refers to the packing of the product itself by the manufacturer, while distribution packaging refers to the packing of ordered products for delivery by the retailers. Therefore, retailers can differentiate their distribution packaging types. The distribution packaging types of the major online grocery retailers are the paper bag/box, the market cooler bag and the newly introduced personal icebox. Some companies such as Market Kurly mainly use paper boxes for delivery, whereas others such as Coupang generally use market cooler bags. Emart Mall uses paper bags for daytime deliveries and market cooler bags for dawn deliveries. The idea of using a personal icebox involves the consumer putting their own icebox at the door before the purchased items arrive. Then, instead of using the market cooler bag, the delivery person places the products in the consumer's bag/box despite the fact that it is not from that particular online mart. Unlike the market cooler bag, the icebox can be shared by many different online retailers.

These packaging types have different levels of temperature-maintenance function and eco-friendliness. As was mentioned, since fresh foods can easily perish or melt depending on the temperature, customers may place great importance on the temperature-maintenance function of packaging. Usually, large e-grocery retailers deliver their products directly based on a cold chain system using refrigerated vehicles for promptness and proper temperature control. In this way, the temperature is maintained throughout the delivery process. However, the waiting time between the time the products arrive at the customer's door and the time the customers actually take receipt of them should not be overlooked. For example, dawn delivery services often arrive as early 3 or 4 a.m., with the customer actually taking receipt of it at 7~8 a.m., which means that the fresh food is left at room temperature for three to five hours. In this case, temperature control during the waiting time via proper packaging is a necessity.

The eco-friendliness of the packaging is another important attribute of a delivery service. Food products are frequently purchased in small quantities, and room temperature, refrigerated and frozen foods are often packaged separately, leading to an excessive amount of packaging waste. Many customers have recognized this environmental issue and try to select an eco-friendly packaging type. Companies have also made efforts to improve their eco-friendly image by using sustainable packaging. However, the controversy over which packaging type is more environmentally friendly continues [8]. 'Paper boxes' can be recycled but are not reusable and thus should be disposed of after each use; on the other hand, 'market cooler bags' are reusable but cannot be recycled [9]. Moreover, many online retailers deliver products only in their own branded market cooler bags, and thus

customers may keep numerous bags in their homes. For example, if a person is a customer of three different online grocery retailers such as Emart Mall, Coupang and LotteMart, then he/she might keep three different market cooler bags in their home, which is inconvenient for the customer as well as harmful for the environment. A new packaging method that relies on the customer's own icebox is environmentally friendly given its higher reusability compared with a market cooler bag and the fact that it produces less packaging waste than a paper box. However, it remains unpopular thus far.

Since it is only recently that there has been significant progress in the diversification of these delivery types, there are only a limited number of previous studies examining customer preferences for them so far. Although, some previous research studied customer preferences for diversified delivery types, there are practically no studies focusing on targeting South Korean online grocery markets. For example, Peiling and Tingting [10] investigated consumer preferences for delivery types for the online retailing of fresh products in Sweden; however, in their research, delivery time options (dawn, daytime), which are extremely important in South Korea, are not included. Similarly, Talalyan and Obasi [11] examined the preferences of Norwegian consumers for the diversified delivery types; however, they focused on apparel products and the delivery attributes (delivery location, delivery speed, delivery cost and return cost), and the related levels they used differ significantly from those in South Korea's grocery market. Besides these, previous research related to the present study examined customer preferences for online grocery delivery packaging in South Korea [12]. However, it only focused on packaging types rather than considering other attributes such as delivery time options. Therefore, this study intends to address these gaps in the literature by examining the delivery types of major online grocery retailers in South Korea.

The purpose of this paper is to analyze customer preferences for delivery services for online grocery shopping in South Korea. Specifically, six overall delivery types consisting of combinations of two delivery time options (dawn, daytime) and three packaging types (paper box, market cooler bag, personal icebox) are examined.

The research questions in this paper are as follows. Which delivery types do customers prefer among the six aforementioned combinations? What factors do customers consider to be more important between delivery time options and packaging type options? What is the perceived value of each level of the delivery factors—specifically the utility of dawn delivery vs. daytime delivery and the utility of the paper box, market cooler bag and their own icebox? Are there any differences in preferred delivery types depending on the type of consumer?

In order to answer these questions, this paper analyzed the following three factors. The first was the delivery types preferred by customers among the six possible combinations. Descriptive statistics and ANOVA were used for analysis of this factor. The second factor was the delivery features customers prioritized between the delivery time and the packaging type and the utility of each level. The conjoint analysis was conducted using the entire dataset for this analysis. The third factor focused on consumer preferences according to the demographic characteristics of the consumers. For this analysis, conjoint analyses for several subgroups having different characteristics, such as gender, age and occupation, were conducted separately.

There are three main findings. First, customers most strongly prefer dawn delivery using a personal icebox. Similarly, customers' perceived value of dawn delivery is higher than that of daytime delivery, and customer preference for the personal icebox is highest among the three packaging types. Second, consumers value the packaging type more than the delivery time when selecting a delivery service. Lastly, the preferred delivery type and the intensity of this preference by consumers differs according to their characteristics.

This study contributes to finding the customer preferences for the diversified delivery service types in South Korean online grocery retailing. In more detail, this study empirically confirms that customers prefer dawn delivery to daytime delivery, which is a novel finding that has never been previously researched. In addition, this study newly finds that cus-

tomers consider the packaging type more important than the delivery time in determining the delivery service type, which suggests that online grocery retailers should focus more on the packaging type than the delivery time option. It is expected that the results will help online grocery retailers establish and improve their delivery strategy.

The rest of this paper is organized into four sections. Section 2 reviews the literature related to the current study. Section 3 explains the data and research methodology used in this study. The results of this study and discussion are presented in Section 4; finally, concluding remarks are given in Section 5.

2. Literature Reviews

2.1. Delivery Services for Online Shopping

With the rise of e-commerce, delivery services have grown increasingly important, and many e-commerce players have identified them as a key differentiator [3]. Liu et al. [13] identified factors that influence Chinese customers' online shopping satisfaction levels based on a survey of 1001 online customers. As a result, they suggested that eight constructs – information quality, website design, merchandise attributes, transaction capabilities, security/privacy, payment options, delivery options and customer service—are strongly predictive of online shopping customer satisfaction. Specifically, safe and rapid delivery had the greatest impact on customer satisfaction according to their study. Similarly, Guo et al. [14] identified the determinants of consumer satisfaction with online shopping based on a survey of 350 online shoppers in China. They found that website design, security, information quality, payment methods, e-service quality, product quality, product variety and delivery service are positively related to consumer satisfaction, with the delivery service being the most powerful factor among them. Lin et al. [15] analyzed factors affecting online customer satisfaction in Taiwan. They found that, while information quality, system quality, service quality, product quality, delivery quality and perceived price are all important, product and delivery quality are more important than other factors. Kim [16] developed a model that measures online customer satisfaction on e-commerce, finding that a delivery service is one of the important factors significantly affecting customer satisfaction as well. In their study, the e-commerce delivery service quality is measured in terms of acceptable delivery times, specified delivery times, prompt notifications of delivery problems and reliable delivery times. There are many other previous studies showing that the quality of the delivery service has a significant effect on online customer satisfaction [17–21].

As the importance of delivery services in relation to customer satisfaction has been highlighted, e-commerce vendors are working diligently to offer the best customer experience for their delivery services. First, many e-grocery retailers strive to differentiate their delivery service by offering a range of delivery times [3]. The concept of delivery time in e-business includes promptness, timeliness and accuracy of delivery, referring to how quickly the products are delivered, whether customers can specify their arrival time or not, and whether the products are actually delivered on time, respectively. Several studies have examined customer preferences with regards to different delivery speeds or arrival time slots. For example, researchers have studied customer preferences in relation to different delivery speeds, such as instant delivery, same-day delivery and next day delivery [3,10,11,22]. The dawn delivery service type is also related to timeliness because the concept of dawn delivery is related to the arrival time. Some e-retailers such as Market Kurly and Coupang provide rapid delivery services as well by allowing orders to be placed as late as midnight with deliveries guaranteed to arrive by 7 a.m. the next day [4,23]. Uatay et al. [5] explored customer perceptions and impressions of dawn delivery services. They analyzed Naver blog posts by means of text mining and association analysis and identified customer emotions related to specific brands of Korean dawn delivery services, specifically Market Kurly, Coupang and Emart Mall. Kim et al. [24] examined the effects of customers' perceived value of dawn delivery services on their continuous use intention. They identified factors related to perceived benefits and risks based on the value-based

adoption model and examined the influence of these factors on customers' perceived value of the dawn delivery service. They showed that perceived benefits influence perceived value, which leads to the intention of continuous use of the dawn delivery service. Lee et al. [25] analyzed the utilization status of an early-morning fresh food delivery service and corresponding dietary-behavior-related consumer competencies. Their findings suggested that healthy dietary competency positively affects satisfaction with a dawn delivery service, which leads to a stronger intention to repurchase.

Next, there is some previous research studying diversified distribution packaging types and their functions. The main functions of distribution packaging are to make transportation easier, protect products and provide important information, such as "fragile" or "this side up" markings, helping to ensure that purchased items arrive undamaged at their end location [26]. In addition, a temperature control function is important for fresh food delivery, and eco-friendliness has been recognized as important as well [12].

Korea Conformity Laboratories [9] investigated four widely used distribution packaging types for grocery delivery, as presented in Table 1. These are a paper box; a cooler bag made of polyethylene (PE); a cooler bag made of PE, polyethylene terephthalate (PET) and ethylene vinyl acetate copolymer (EVA); and lastly a cooling box made of polypropylene (PP). They presented examples and discussed the characteristics of each packaging type. First, paper boxes can be recycled but cannot be reused. The Korean online grocery retailer Market Kurly uses this packaging type. Secondly, cooler bags made of PE can be reused but not easily recycled. An e-grocery retailer, Hello Nature, uses this type of packaging. Similarly, the third packaging type made of PE, PET and EVA can be reused but cannot be recycled. Emart Mall uses this packaging type for their dawn delivery service. Lastly, the cooling box made of polypropylene (PP) is also reusable but not recyclable. No retailers use this type of distribution packaging in South Korea thus far, and the United States (US) company "Liviri" manufactures it, referring to it as a LiviriFresh box.

Table 1. Examples of Distribution Packaging for Foods that Must be Kept Cool [9].

				
Name	**Eco Box**	**The Green Box**	**I'll Be Bag**	**LiviriFresh**
Packaging type	Paper box	Market cooler bag	Market cooler bag	Market cooler bag
Company	Market Kurly	Hello Nature	Emart Mall	Liviri
Material	Paper (recycled pulp)	Plastic (PE)	Plastic (PE, PET, EVA)	Plastic (PP)
Reusability	Non-reusable Recyclable	Recyclable 20 times or more	Recyclable 20 times or more	Recyclable 75 times or less

If packaging types are subdivided by more detailed criteria, such as the thickness of paper boxes, the filling materials inside cooler bags or whether the inside paper is coated or not, it becomes possible to consider even more types of delivery packaging [27]. However, it is extremely difficult for consumers to recognize these detailed differences, such as whether the cooler bag is made of PE, PET or EVA or whether the paper box is coated or not. Therefore, in order to examine consumer preferences with regards to packaging type, differences should be simplified to a level noticeable by consumers. In a previous study, Park [12] examined factors affecting consumer preferences in e-commerce distribution packaging types for fresh food, considering three packaging types as in the present study (the paper

box, market cooler bag and personal icebox). The analysis showed that consumers most prefer the personal icebox, while the paper box was the least desired option, as echoed in the results of the present study. However, the previous investigation did not consider delivery time as a research factor. In addition, the research questions and the experimental design also differ from those of the present study: namely, the study sought to identify the packaging type preferred by customers and the factors affecting these preferences using regression analysis. Meanwhile, the current study examines customer preferences for the six delivery types considering not only delivery packaging type but also delivery time options and how customer preferences differ according to customer characteristics; it accomplishes this using conjoint analysis. Jang and Kim [27] also conducted a case study of distribution packaging designs focusing on e-grocery markets. They investigated the distribution packaging types of four companies, Coupang, Market Kurly, Emart Mall and Amazon, for room temperature/refrigerated/frozen products, as shown in Table 2.

Table 2. Distribution Packaging Types used by Online Grocery Stores [27].

Product Temperature	Coupang	Market Kurly	Emart Mall	Amazon
Room temp. products	Paper box	Paper box	Plastic box (in absence) Paper bag	Reusable bag, Paper box
Refrigerated products	Cold cardboard box	Waterproof Paper box		
Frozen products	EPS box	EPS box		Fiber-filled insulated bag

2.2. Conjoint Analysis

This paper uses conjoint analysis to determine the customer preferences for delivery service types in online grocery shopping. In this section, a conjoint analysis method and its characteristics are explained. Following that, the previous research using conjoint analysis for analyzing customer preferences in the area of online delivery services is presented.

Conjoint analysis is a survey-based statistical technique used in market research which helps to determine how people value different attributes of a product or service. The objective of a conjoint analysis is to determine what combination of a limited number of attributes is most influential on respondent decision making [28]. It asks respondents to evaluate multiple scenarios of a service having different attribute levels so as to determine the relative importance of each choice. According to Danaher [29], there are mainly three benefits of using conjoint analysis. First, it is a powerful method for operationalizing multiple measurements from respondents at various attribute levels. Second, it enables customer response measurements at an individual level as well as an aggregate level. Lastly, a conjoint analysis with an orthogonal design has no correlations among the attributes, meaning that the relative importance weights that reflect true importance levels can be calculated. This method has been widely used in the marketing field to find optimal combinations of product or service attributes [30–32].

Several earlier works have studied customer preferences in the area of online delivery services by means of conjoint analysis. Peiling and Tingting [10] investigated consumer preferences for logistics services for the online retailing of fresh products in Sweden. They performed conjoint analysis based on 161 surveys collected in Sweden. They considered four delivery attributes: the delivery location (home delivery, pick-up point, parcel locker), delivery speed (same day, next day, in one week), delivery fee (free, 1–50 Kr, 51~100 Kr) and packaging materials (normal, green). Given the four attributes and their levels, a total of 54 ($3 \times 3 \times 3 \times 2$) profiles were constructed. The results showed that free home delivery was the preferred choice and that a green packaging material was much more attractive than ordinary materials. However, the delivery speed was not overly important compared to the other attributes. Talalyan and Obasi [11] examined the preferences of Norwegian consumers in logistics services when they make online purchases of apparel products. They also used conjoint analysis to determine what combination of delivery attributes is most influential on Norwegian consumers' decision-making outcomes. They

considered four delivery attributes: the delivery location (home delivery, pick-up point, mailbox), delivery speed (express, standard), delivery cost (free, 1–50 NOK, 51–100 NOK) and return cost (free, 1–50 NOK, 51–100 NOK). The analysis results showed that the profile most preferred by the respondents consists of free and express delivery to a mailbox with a free return process. Moreover, the most valued attribute for consumers is the delivery cost followed by the return cost, delivery location and delivery speed, which indicates that cost-related attributes are considered more important than other factors. Restuputri et al. [22] also identified the preferences of customers of logistics services in Indonesia using the conjoint analysis method. In their study, data were collected from 100 respondents living in several cities around Indonesia. They considered five attributes of the logistics provider—delivery speed (fast, slow), courier attitude (polite, impolite), order information (accurate, inaccurate), condition of goods (damaged, undamaged) and warehouse location (far, near). Their study concluded that undamaged products and a polite attitude from the courier are the two most important attributes of a logistics service. In addition, Schaupp and Bélanger [33] conducted a conjoint analysis to examine the effects of several factors related to technology, shopping and products on online customer satisfaction. For each factor, three attributes having three different levels were considered. For example, the shopping factor consisted of convenience, trust and delivery attributes, having three levels each. The three levels in the delivery attributes factor were minimization of the delivery time, awareness of potential delays and tracking numbers. Their study concluded that the three attributes most important to consumers for online satisfaction are privacy (technology factor), merchandising (product factor) and convenience (shopping factor), followed by trust, delivery, usability, product customization, product quality and security.

While the aforementioned studies have used conjoint analysis to find the optimal delivery service types for online shopping as a whole, it seems that there are no previous studies utilizing conjoint analysis examining customer preferences that focus on online grocery shopping. Furthermore, there is an absence of previous research into customer preferences for delivery types consisting of a combination of delivery time options and delivery packaging options, which are extremely important factors in fresh food delivery.

3. Research Methodology

3.1. Data

The data for this study were collected from the responses of 218 consumers who use an online grocery store at least twice a month regularly as of July 2020. This is above the minimum recommended sample size of 100~200 to obtain reliable results with conjoint analysis [34]. The respondents' gender, age, educational level, occupation, monthly household income and whether they have children are presented in Table 3. The percentages of male and female were 51.8% and 48.2%, respectively. For age groups, those in their 30s and 40s accounted for the largest percentage at 77.1% of the total, followed by those in their 20s at 14.7% and those in their 50s at 8.3%. In terms of education, 77.1% of respondents were college graduates. In addition, 51.8% reported that they had children, slightly higher than those with no children at 48.2%. Around half of the respondents worked as administrative/office workers (50.5%), followed by housewives (14.7%), professionals (14.2%) and sales/service workers (9.2%). With regards to household income, the proportion of respondents with monthly incomes of three million to five million won and from five million to seven million won were 31% each, followed by those making seven million to nine million (15.6%), those making less than three million (13.8%) and those making nine million or more (9.2%).

Table 3. Demographics of the Respondents.

Demographic Categories		Frequency (#)	Percentage (%)	Demographic Categories		Frequency (#)	Percentage (%)
Gender	Male	113	51.8	Occupation	Student	7	3.2
	Female	105	48.2		Housewife	32	14.7
	Total	218	100		Admin./Office worker	110	50.5
Age	20~29	32	14.7		Professional	31	14.2
	30~39	92	42.2		Sales/Service	20	9.2
	40~49	76	34.9		Tech./Production	9	4.1
	50~59	18	8.3		Other	9	4.1
	Total	218	100		Total	218	100
Educational level	High school	26	11.9	Monthly household incomes (1000 won)	below 3000	30	13.8
	College	168	77.1		3000 to less than 5000	67	30.7
	Graduate or more	24	11		5000 to less than 7000	67	30.7
	Total	218	100		7000 to less than	34	15.6
Children	Yes	113	51.8		9000 or more	20	9.2
	No	105	48.2		Total	218	100
	Total	218	100				

Next, the respondents' online mart usage patterns were examined. According to this survey, 65.6% of the respondents purchased groceries online in two to four times a month, 24.8% used this service five to seven times a month, and 9.6% used it more than eight times a month. In addition, most of the respondents used more than two online grocery stores (94%), whereas only 6% of respondents used only a single online grocery store. The online-grocery store usage patterns of the respondents are presented in Table 4.

Table 4. Transactional Patterns of the Respondents.

Variable		Frequency (#)	Percentage (%)
Average # of online mart usage events (In four weeks)	2~4	143	65.6
	5~7	54	24.8
	8 or more	21	9.6
	Total	218	100
# of e-grocery stores used (in the last six months)	1	13	6.0
	2	92	42.2
	3	65	29.8
	4 or more	48	22.0
	Total	218	100

3.2. Conjoint Analysis Procedure

In this study conjoint analysis was used to examine the relative importance weights for delivery methods as perceived by consumers. Since delivery service types are a combination of many attributes such as delivery time, delivery packaging types and delivery fees, conjoint analysis was selected as an appropriate method to determine what combination of a limited number of attributes is most influential on customers' decision making. In

addition, it is a helpful means of establishing the relative importance of each attribute and the utility of each level for those attributes.

In this paper, the conjoint analysis was constructed with the six steps in Table 5. These steps are widely used in many other studies that rely on conjoint analysis [31,33,35].

Table 5. Steps in the Conjoint Analysis.

Step	This Study
1. Formulate the problem	Identify attributes and levels
2. Select a model of preference	Part-worth function model
3. Data collection method & Stimulus set construction	Full profile
4. Stimulus presentation	Written instructions
5. Measurement scale for the dependent variable	Metric (rating scales)
6. Estimation method	Ordinary least square

- Step 1. Formulate the problem

A conjoint analysis problem is formulated by identifying attributes and their levels so as to construct the stimuli [11]. It is desirable to have a small number of attribute levels to minimize the respondents' evaluation task and at the same time to ensure reasonable accuracy in the estimations of the parameters [36]. Steiner and Meißner [37] point out that choosing between two and five levels for each attribute is advisable.

In this study, the delivery time and logistic packaging type were selected as the attributes related to last-mile delivery services of e-grocery retailers, as many e-grocery companies in South Korea attempt to differentiate by providing a dawn delivery service or certain packaging types. In order to determine the levels of each attribute, the major online grocery retailers Coupang, Market Kurly and Emart Mall were examined. According to this preliminary investigation, the delivery times were determined as dawn delivery and daytime delivery, and the types of distribution packaging were determined as a paper box, a market cooler bag and a personal icebox. Thus, six (2×3) profiles were constructed in total. Regarding the delivery time, the dawn delivery service means that products are delivered in front of the consumer's door between 12 a.m. and 7 a.m.; the daytime delivery service means that products are delivered from 10 a.m. to 9 p.m. with three-hour intervals. For the packaging types, paper boxes are sent from the online grocery store for one-time use. Because these are made of paper, they can be recycled but not reused. Market cooler bags are reusable insulated bags used exclusively by a certain e-grocery store. They are rented after receiving a deposit from the consumer, and the consumer can keep the bag afterwards. When the consumer purchases products from the online grocery store, he/she puts this type in front of their door the day before the purchased items arrived so that the items can be delivered to the bag. The personal icebox is reusable and has a temperature-maintenance function, similar to the market cooler bag, and how this bag is used is also similar to how the market cooler bag is used. In other words, the consumer puts their personal icebox, instead of the market cooler bag, at the door the day before the purchased items arrive. Then, the delivery person puts the products in this bag/box despite the fact that it is not from that particular online mart. The attributes and their levels are presented in Table 6, and descriptions of the attributes and the levels used in the questionnaire are described in Appendix A. In this questionnaire, the survey clearly mentioned that it was about fresh food delivery from a new online mart that the respondent had never used before. The reason the survey specifically limited the product category to fresh food was because delivery service types for groceries have diversified more than those of the other categories. Moreover, the reason for specifying that the survey was about buying products from a new online mart that respondents had never used was to prevent them from associating themselves with a particular conventional grocery retailer. In addition, the survey also explained that products are delivered by a refrigerated vehicle and placed on the respondent's doorstep

with ice packs for refrigerated/frozen foods, since it is the typical delivery process of major grocery retailers in South Korea.

Table 6. Attributes and Corresponding Levels.

Attributes	Attribute Levels
Delivery time	Dawn delivery Daytime delivery
Distribution packaging	Paper box Market cooler bag Personal ice box

- Step 2. Selection of the preferred model

The part-worth function model calculates the attribute importance scores and the utility of each level. They are numerical scores that measure how much each feature influences consumer decisions with regards to the selection of an alternative. While there are other preference models, such as the vector model and the ideal point model, the part-worth function model is the most widely used model in general [33].

- Step 3. Data collection method & Stimulus set construction

Data collection procedures in conjoint analysis studies have primarily involved two basic methods: (1) the two-factor-at-a-time approach, also known as the pairwise approach, and (2) the full-profile approach [31]. In the two-factor-at-a-time approach, respondents assess two attributes at a time until a full assessment of all possible attribute pairs is made. In contrast, in the full-profile approach, complete profiles are generated for all attributes, and every attribute is assessed simultaneously [36]. Many researchers have claimed that the full-profile method provides a more realistic assessment of the analyzed problem because the product's/service's attribute features are dealt with together; however, one drawback of this method is the possibility of information overload in the event of a large number of attributes and/or levels [11]. This research used the full-profile method without using a fractional factorial design because there were only two attributes and because the number of profiles was limited to six, a number small enough that all could be considered at once by the respondents.

- Step 4. Stimulus presentation

This study employed a paragraph description method for profile cards. The respondents were asked to provide their preference ratings for the presented delivery services of e-grocery retailers using a seven-point Likert scale (1 = very unlikely and 7 = very likely), as presented in Table 7. When presenting the profile cards, it was clearly stated that the questionnaire was about a new online grocery store not used previously by the respondents so that they would not associate it with any existing online store according to the delivery type.

Table 7. Profiles Designed for the Questionnaire.

Card #	Time	Packaging	Preferences								
			Very Unlikely	1	2	3	4	5	6	7	Very Likely
1	Daytime	Paper box		○	○	○	○	○	○	○	
2	Dawn	Personal icebox		○	○	○	○	○	○	○	
3	Dawn	Market Cooler Bag		○	○	○	○	○	○	○	
4	Daytime	Personal icebox		○	○	○	○	○	○	○	
5	Daytime	Market Cooler Bag		○	○	○	○	○	○	○	
6	Dawn	Paper box		○	○	○	○	○	○	○	

- Step 5. Measurement scale for the dependent variable

There are two basic alternatives when defining a measurement scale for a dependent variable: metric (ratio scales, ratings, assuming approximately interval scale properties) and non-metric methods (paired comparisons, rank order). The main advantage of the metric method is the increased information content potentially present in the scales [31]. This study used the metric method based on consumer preference ratings so that consumers could express the same preference for different delivery methods. In other words, if a consumer preferred daytime delivery using a market cooler bag and daytime delivery using a paper bag equally, then the metric method allowed this, unlike the non-metric method, which asks consumers to rank their preferences.

- Step 6. Estimation method

The parameter estimation method used in this study was ordinary least squares (OLS) regression. There are several parameter estimation methods that can be used with conjoint analysis, such as MANOVA, OLS and LOGIT; however, the OLS procedure is most appropriate when a study includes a dependent variable that is measured on an interval scale [38]. Additionally, this method can estimate the relative importance values of the experimental factors and the part-worth utilities of the factor levels.

3.3. Analysis Methods

This section explains each of the analysis methods corresponding to the three research questions. In order to answer the first question, "Which delivery service types do customers prefer for their grocery shopping among the six delivery types—combinations of two delivery time options (dawn, daytime) and three packaging types (paper box, market cooler bag, a personal icebox)?", average ratings for the six delivery types were calculated and compared. Following on from this, ANOVA was conducted to verify whether the differences between these ratings were statistically significant at a 95% confidence interval.

To answer the second research question, "What factors do customers consider to be more important between delivery time options and packaging type options?", conjoint analysis was used. The outcome illustrated the relative importance of two delivery attributes (delivery time and distribution packaging), thus ascertaining which of them plays a greater role when customers determine their preferred delivery service type. In addition, the conjoint analysis results also showed the overall utility outcomes of each attribute level. Therefore, the customers' perceived value of each delivery packaging type (paper box, market cooler bags, a personal icebox) and that of each delivery time option (dawn delivery and daytime delivery) could be identified.

Lastly, the final question—"Are there any differences in preferred delivery types depending on the type of consumer?"—was analyzed by dividing the dataset into several subgroups having different demographic characteristics, such as gender, age and occupation, and then conducting conjoint analysis for each group separately. In this way, the preferences of each group having different characteristics could be compared.

The aforementioned three analyses were implemented using SPSS version 25; the corresponding results are presented in Section 4.1, Section 4.2, Section 4.3, respectively.

4. Results

4.1. The Preference Ratings of the Customers for the Delivery Service Types

This section presents the results of the first research question—"Which delivery service types do customers prefer for their groceries shopping among the six delivery types? "

The preference ranking of the six delivery types was calculated based on the average ratings of the customers and is presented in Table 8 and graphically depicted in Figure 1. The results show that the consumers most strongly preferred dawn delivery using a personal icebox (5.35), followed by dawn delivery using a market cooler bag (5.08), daytime delivery using the personal icebox (4.99), daytime delivery using a market cooler bag (4.49), dawn delivery using a paper box (4.25) and lastly daytime delivery using a paper box (4.11).

Table 8. Preference Rankings of the Consumers' Average Ratings of Delivery Types.

Rank	Delivery Type	Average Ratings	Std. Dev.
1	Dawn/Personal ice box	5.35	2.170
2	Dawn/Market cooler bag	5.08	2.402
3	Daytime/Personal ice box	4.99	2.375
4	Daytime/Market cooler bag	4.49	2.427
5	Dawn/Paper box	4.25	2.349
6	Daytime/Paper box	4.11	2.441
	Total	4.71	2.402

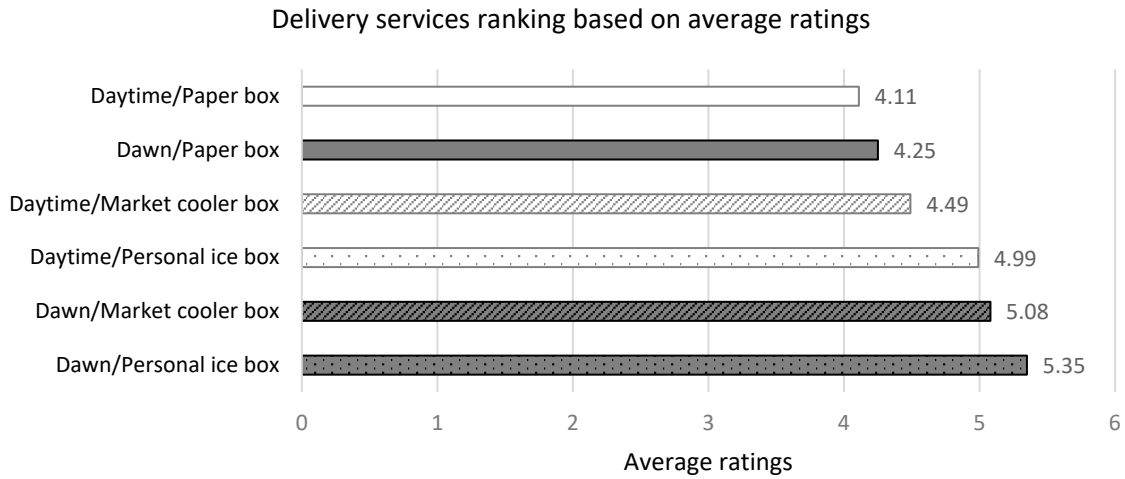

Figure 1. Delivery service rankings based on the average preference ratings.

Next, ANOVA was conducted to verify whether these differences were statistically significant. The results are presented in Table 9. The results show that the ratings for the six delivery types were statistically different at the 99% confidence interval. A post-hoc test was then conducted to identify which particular differences between pairs of means were significant, as shown in Table 10. The result shows that while the dawn delivery service using a personal icebox was the most preferred delivery service type, the differences between this type and the second-best one—the dawn delivery service using a market cooler bag—and the third-best one—daytime delivery with a personal icebox—were not statistically different, whereas they were significantly different from the remaining three types.

Table 9. ANOVA Results of the Average Preference Ratings for the Delivery Types.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	271.492	5	54.298	9.729	0.000
Within Groups	7266.422	1302	5.581		
Total	7537.914	1307			

Table 10. Results of the Post-hoc Test.

Scheffe				
Delivery Type	**Sub Groups (Sig. Level = 0.0)**			
	1	**2**	**3**	**4**
Day-Personal box	4.11			
Dawn-Paper box	4.25	4.25		
Day-Market cooler bag	4.49	4.49	4.49	
Day-Paper box		4.99	4.99	4.99
Dawn-Market cooler bag			5.08	5.08
Dawn-Personal ice box				5.35
Sig. Level	0.726	0.059	0.242	0.767

In short, the best delivery service type according to the average ratings was found to be dawn delivery using a personal ice box, and the average preference ratings for the six delivery types were statistically different.

4.2. The Relative Importance Weights and Utilities of the Delivery Attributes

In this section, the results of the second research question—"What factors do customers consider to be more important between delivery time options and packaging type options?"—are presented. Conjoint analysis was conducted to calculate the relative importance weights of two delivery attributes (delivery time and distribution packaging) and the utility values of the delivery attribute levels.

The results show that the relative importance of the packaging type was 75.7%, whereas that of the delivery time was 24.3% (see Table 11). This indicates that the packaging type attribute plays a more important role than the delivery time when customers are determining their preferred delivery type in online grocery shopping. The relative importance values of each attribute are also graphically depicted in Figure 2. The goodness of fit of this conjoint analysis was tested based on Pearson's R and Kendall's tau measurements. These values measure the correlations between the observed and estimated preferences. The values of Pearson's R and Kendall's tau statistic were 0.98 and 0.86 respectively, as shown in Table 11, and the significance levels from a two-tailed test are both less than 0.001. This indicates that the conjoint analysis has a good and efficient model fit. Therefore, the results ascertain that the packaging type plays a significantly more important role than the delivery time in customers determining their preferred delivery type in online grocery shopping.

Table 11. Overall Conjoint Analysis Results.

Attribute	**Level**	**Utility Estimation**	**Relative Importance (%)**	**Goodness of Fit**
Delivery time	Dawn	0.182	24.280	Pearson's R (0.98 ***)
	Daytime	−0.182		
Packaging type	Paper box	−0.531	75.720	Kendal's Tau (0.867 **)
	Market cooler bag	0.072		
	Personal icebox	0.459		

: TPL significance probability < 0.01, *: TPL significance probability < 0.001.

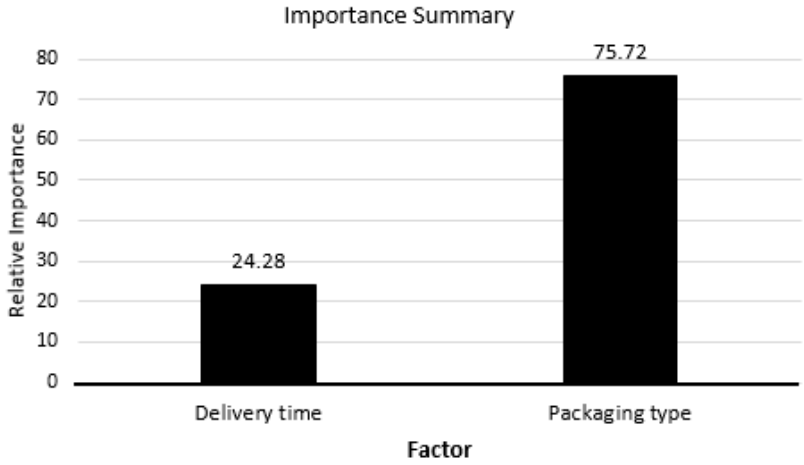

Figure 2. Average relative importance of delivery time and packaging type.

Next, the utility values of the two attribute levels are presented. The outcome of the conjoint analysis also shows customers' perceived values of each delivery packaging type (paper box, market cooler bags and a personal icebox) and those of the delivery time options (dawn delivery and daytime delivery). Figure 3 shows the utility values of the delivery time levels, and Figure 4 presents those of the packaging type levels. For the delivery time, the utility of dawn delivery was 0.182, whereas the utility of daytime delivery was −0.182, which means that the consumers preferred the dawn delivery service over daytime delivery (see Figure 3). For the packaging types, the personal icebox had a positive utility score of 0.459, the market cooler bag had a utility score of 0.072, and the paper box had a negative utility score of −0.531 (see Figure 4), which means that the consumers preferred personal iceboxes the most, market cooler bags the next and paper boxes the least. These results indicate that the newly introduced personal icebox has the potential to become a major distribution packaging type in the future. In addition, consumers do not perceive a paper box to be a good packaging type for grocery delivery. The probable reason for this is the high reusability and cooling function of the personal icebox, which is in sharp contrast to the low cooling effect and low reusability and the inconvenience of separating and collecting paper waste for recycling of the paper box.

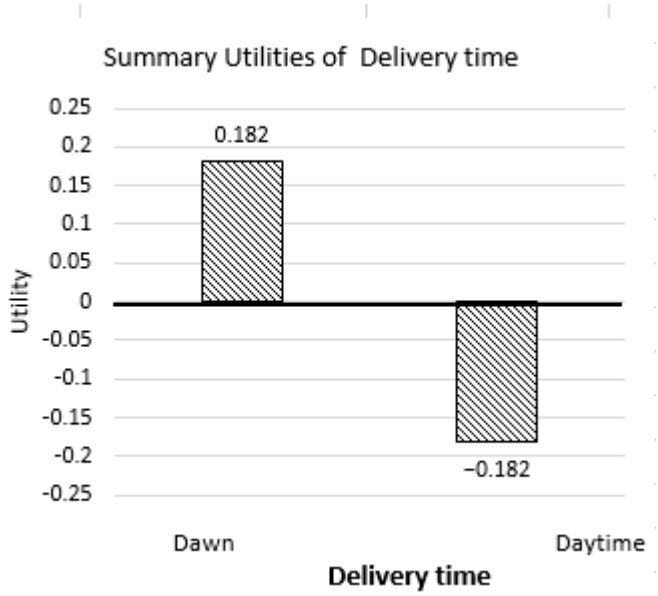

Figure 3. Utility values of different delivery times.

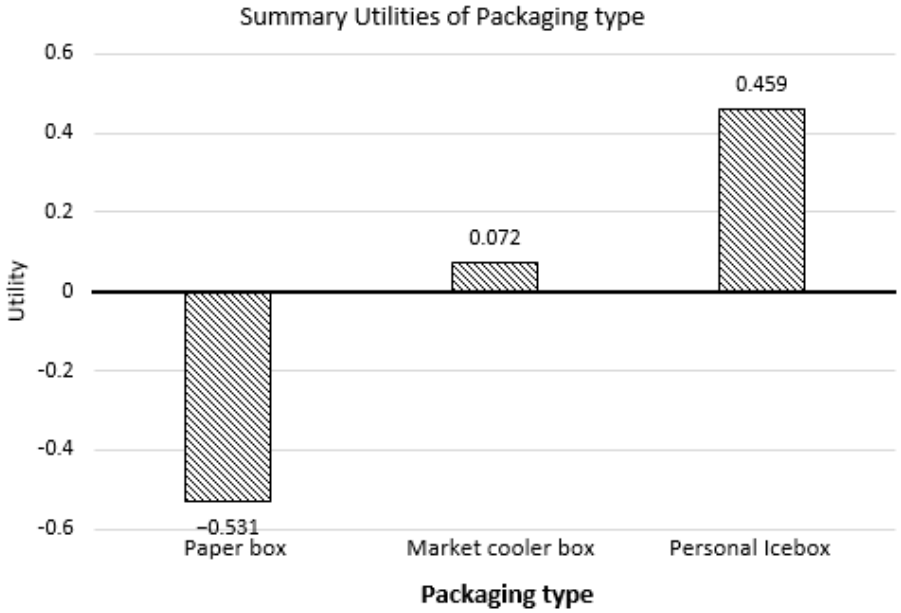

Figure 4. Utility values of different packaging types.

In summary, the consumers considered the packaging type more important than the delivery time when determining their preferred delivery types for online grocery shopping. Furthermore, they valued dawn delivery over daytime delivery and the personal icebox over the market cooler bag and the paper box.

4.3. Conjoint Results for Each Subgroups According to Customer Characteristics

This section presents the results of the final question—"Are there any differences in preferred delivery types depending on the type of consumer?". The results of conjoint analysis conducted for several subgroups having different demographic characteristics, such as gender, age and occupation, are presented accordingly as follows.

4.3.1. Conjoint Analysis Results for Groups Divided by Gender

The dataset was divided into two groups according to the gender of the respondents, after which conjoint analysis was conducted separately for each gender group. Table 12 presents each set of conjoint analysis results for the male and female groups. The results show that there was no major difference in the perceived importance of the delivery time and packaging type between males and females as the difference was small at 1.4%. However, the utility values of the two gender groups were clearly different. By looking at the utility values of the delivery time levels, both males and females preferred dawn delivery to daytime delivery, although the preference of the male group for dawn delivery (0.232) was almost twice that of females (0.129). This is presumably because there are a larger number of males going to work during the daytime than females, resulting in males exhibiting a stronger preference than females for this delivery time option.

Table 12. Conjoint Analysis Results for Groups Divided by Gender.

Attribute	Level	Male (113)		Female (105)	
		Utility	Importance	Utility	Importance
Delivery time	Dawn	0.232	23.643124	0.129	24.966
	Daytime	−0.232		−0.129	
Packaging type	Paper box	−0.320	76.356876	−0.759	75.034
	Market cooler bag	0.052		0.094	
	Personal icebox	0.268		0.665	
Total			100		100

By looking at the utility values of the packaging type levels, there was also a clear difference in the strength of the packaging type preferences between males and females. The female group showed much higher utility for the personal icebox (0.665) than the male group (0.268), and they showed much lower utility for the paper box (−0.759) than the male group (−0.32). In other words, in order of preference both the male group and female groups chose the personal icebox, followed by the market cooler bag and lastly the paper box. However, the female group had much stronger preferences with regards to the packaging type, showing a much higher utility value for the personal icebox and a much lower utility value for the paper box than the male group. It is presumed that females are often more likely to be in charge of household chores, such as cooking and either recycling or keeping reusable packaging after deliveries, than males. Therefore, they consider the freshness of food and the convenience of packaging disposal or storage to be more important than males. Since personal iceboxes have temperature control functions, they are easy to keep at home, and there is no paper packaging to dispose of after delivery; these are thought to be the reasons why personal iceboxes were much strongly preferred by the female group compared to the male group.

4.3.2. Conjoint Analysis Results for Groups Divided by Age

The dataset was divided into four subgroups of respondents in their 20s to 50s, after which conjoint analysis was conducted separately for each age group. The results of conjoint analysis for each age group are presented in Table 13. In every generation, the packaging type played a more important role in determining consumer preferences for delivery type than the delivery time, a finding identical to the overall results in Section 4.2. In particular, older consumers considered the packaging type much more important than the delivery time. In more detail, the average importance score for delivery time for those in their 20s was 72.86%; however, for those in their 30s this score became 73.25%; for consumers in their 40s it was 78.11%, and for those in their 50s it became 83.35%, clearly showing that older consumers value the packaging type as more important while valuing the delivery time less as less important. By looking at the utility values of the delivery time levels, with age, the utility scores for dawn delivery tend to decrease. For consumers in their 20s, the utility value of dawn delivery was 0.271, which is the highest among all age groups. However, the score decreased for those who were older; the utility score for those in their 30s was 0.217, and this score for those in their 40s became 0.175. For consumers in their 50s, the utility value of the dawn delivery service had a negative value of −0.13, meaning that those in their 50s valued dawn delivery even less than daytime delivery (0.13). In other words, there are clear tendencies that the younger generation values the delivery time more and has a stronger preference for dawn delivery than the relatively older generation. This is presumed to be because the younger generation are more active and likely to go out during the daytime compared with the relatively older generation, and therefore they prefer dawn delivery more than daytime delivery.

Table 13. Conjoint Analysis Results for Groups Divided by Age.

Attribute	Level	20s (32)		30s (92)		40s (76)		50s (18)	
		Utility	Importance	Utility	Importance	Utility	Importance	Utility	Importance
Delivery time	Dawn	0.271	27.137	0.217	26.750	0.175	21.894	−0.130	16.654
	Daytime	−0.271		−0.217		−0.175		0.130	
Packaging type	Paper box	−0.490	72.863	−0.658	73.250	−0.430	78.106	−0.389	83.346
	Market cooler bag	0.151		0.266		−0.147		−0.139	
	Personal icebox	0.339		0.391		0.577		0.528	
Total		100		100		100		100	

Regarding the utility scores of the packaging type levels, every age group preferred the personal icebox most strongly, followed by the market cooler bag and lastly the paper box, as in the general results, and there was no particular tendency by age group.

4.3.3. Conjoint Analysis Results for Groups Divided by Occupation

The occupational group consisted of seven subgroups in total; however, the largest two groups were workers and housewives, which together accounted for 65.2% of the total. This section presents the conjoint analysis results of these two major occupational groups as shown in Table 14.

Table 14. Conjoint Analysis Results for Groups Divided by Occupation.

Attribute	Level	Housewife		Worker	
		Utility	Importance	Utility	Importance
Delivery time	Dawn	0.099	21.660	0.202	25.062
	Daytime	−0.099		−0.202	
Packaging type	Paper box	−0.922	78.340	−0.437	74.938
	Market cooler bag	0.188		0.027	
	Personal icebox	0.734		0.410	
Total		100		100	

As in the general importance results, packaging type was perceived as more important than delivery time in both occupational groups; however, the worker group considered delivery time (25%) to be relatively more important than the housewife group did (21.6%). Examining the utility scores for the delivery time levels, the worker group had a stronger preference for dawn delivery (0.202) than the housewife group (0.099). This is presumed to be because the worker group goes out to work during the daytime, so they place greater value on delivery time, specifically dawn delivery, so that they can receive groceries before going out. On the other hand, the housewife group often stays at home during the daytime, so delivery time may not be an important factor.

Next, looking at the utility scores of the packaging type levels, there was a clear difference in the strength of the packaging type preferences between the worker group and the housewife group. The housewife group showed much higher utility for the personal icebox (0.734) than the worker group (0.41), and they showed much lower utility for the paper box (−0.922) than the male group (−0.437). The results were similar to those of the male and female groups presented in 4.3.1, in that the female group had much stronger preferences with regard to the packaging type, as with the housewife group. This may be due to the correlation between occupation and gender. In other words, the proportion of

female housewives is relatively higher than male housewives and the proportion of male workers is usually higher than that of female workers.

4.4. Overall Results and Discussion

This section presents the summarized results and discusses possible reasons for these results. The implications are considered, as well as how these results can be used in the future.

The summarized results are presented in Table 15 along with the research questions and the corresponding analysis methods. First, the best delivery service type among the six types based on the average customer preference ratings is dawn delivery using a personal icebox. This result is consistent with the results of the utility levels in that the utility of dawn delivery is higher than that of daytime delivery, and the utility of the personal icebox is the highest among the three packaging types. The reason why the customers preferred dawn delivery may be due to the high perceived timeliness of dawn delivery. Dawn delivery guarantees to deliver products by 7 a.m., so customers can receive them immediately after waking up. Even though the received products are often left at the customer's door for several hours while they sleep, customers feel that they receive products in a timely manner.

Table 15. The overall results according to the research questions.

Research Question 1	Which delivery service types do customers prefer for their groceries shopping among the six delivery types?
Analysis Method	Ranking the average customer preference ratings & ANOVA
Result	Dawn delivery using the personal ice box is the preferred delivery service type
Research Question 2	What factors do customers consider to be more important between delivery time options and packaging type options?
Analysis Method	Conjoint Analysis
Result	Customers consider packaging type more important than delivery time The utility of packaging type attribute levels Personal icebox > Market cooler bag > Paper box The utility of delivery time attribute levels Dawn delivery > Daytime delivery
Research Question 3	Are there any differences in preferred delivery types depending on the type of consumer?
Analysis Method	Conjoint Analysis for each subgroups having different characteristics
Result	The male and the worker groups express a much stronger preference for dawn delivery than the female and the housewife groups respectively. The female and the housewife groups prefer the personal icebox and dislike the paper box much more than the male and worker groups respectively. The younger generation values the delivery time more than over 50s. The younger generation have a stronger preference for dawn delivery than over 50s. The worker group considers delivery time to be more important than the housewife group.

In addition, the reasons why the customers most preferred the personal icebox as a delivery packaging type could be related to the characteristics of the personal icebox. The personal icebox has a high cooling effect and thus is helpful for keeping food fresh, even though the products may be left outside at room temperature for several hours. Additionally, it is environmentally friendly given its high reusability and there being no need to dispose of paper packaging waste after delivery.

Next, the packaging type is a more important attribute than the delivery time for determining consumer preferences for delivery service type. It means that the customers felt the difference among the packaging types more clearly than the difference between the delivery time options. Specifically, this tendency was more pronounced in the older generation and housewife groups. This phenomenon may occur because they stay at home during the daytime relatively longer than the other groups, so the time that the product arrives is of less significance to them than the worker group and younger generation.

Lastly, the preferred delivery type and intensity of this preference by consumers differ according to their characteristics. For example, the preference for dawn delivery is much clearer in males, workers and for those who are younger than other groups. The worker group needs to leave the house for work during the daytime, and therefore they may prefer to receive products before going out. Similarly, the younger generation is usually more active and tends to go out more during the daytime compared with the older groups. In addition, the preference for the personal icebox is more evident in the female and housewife groups. This may be due to the housewife and the female groups usually devoting more time to housework activities than the workers and male groups. Therefore, they strongly prefer personal iceboxes, which are an adequate packaging type for keeping food fresh without generating packaging waste.

5. Managerial Implications

5.1. Theoretical Contribution

This study is meaningful in that it provides an understanding of consumers' actual preferences for the dawn delivery service, which has been receiving considerable attention in South Korea at the time of this study. However, there are only a limited number of academic studies conducted into dawn delivery, and almost none compare customer preferences for dawn delivery with preferences for daytime delivery. In other words, previous research related to dawn delivery has solely focused on aspects of dawn delivery itself, such as finding the factors affecting the continuous use intention of dawn delivery [24], measuring customer response to several factors (product, purchase, delivery, utilization and price) constituting a dawn delivery service [5] or the utilization status of it [25], whereas no comparative study between dawn and daytime delivery service has been conducted so far. Therefore, this study makes a novel academic contribution in that it empirically confirms that customers prefer dawn delivery to daytime delivery overall by comparing customers' perceived value of each option.

It is also a new finding that customers consider packaging type to be more important than the delivery time option in the delivery service. This is important as it signals which factor online grocery retailers should emphasize when constituting their delivery service. Previous research has found that customers consider eco-friendly delivery packaging (normal, green) more important than delivery speed (express, standard) in fresh food delivery services [10], which is a somewhat similar result to the current study in that delivery packaging attributes outweigh the delivery time-related factor. However, there is a clear difference between eco-friendly delivery packaging (normal, green) and the actual delivery packaging types (paper box, market cooler bag, personal icebox), and delivery speed and delivery time are also separate concepts. Therefore, this study has unique theoretical contributions compared to previous studies.

5.2. Practical Implication

The results of this study can be used for online grocery retailers to determine and improve their delivery service types. It is highly practical in that it compares customer preferences for the delivery types actually used in major online grocery retailers in South Korea.

The results of this study can be used by online grocery retailers as follows. They can provide the delivery options to their customers so that customers can choose between dawn delivery using a personal icebox and dawn delivery using a market cooler bag, which were considered the two best delivery types in this study. It is recommended for online grocery companies to provide an additional packaging option of using a personal icebox with a market cooler bag rather than using a personal icebox alone. This is because many customers may not have their own personal iceboxes or may not want to put them at the door for fear of losing them. Furthermore, as was explained in Section 4.3.1, there was no statistical difference between the best preferred type—dawn delivery using a personal icebox—and the second-best type—the dawn delivery service market cooler bag.

In addition, online companies that only provide daytime deliveries need to consider changing this to dawn deliveries or additionally providing dawn deliveries in the future, as this was a popular delivery time option in every subgroup except the customers in their 50s. Online grocery retailers may wish to take into consideration their customers' lifetime value, which may lead them to adopt a future-oriented prospect, particularly as the proportion of adults aged 20 and over using online shopping tends to decrease with age [39].

6. Conclusions

This study analyzed customer preferences for different delivery service types of online grocery stores in South Korea. Specifically, consumer preferences for six widely used delivery types consisting of combinations of two delivery time options (dawn, daytime) and three packaging types (paper box, market cooler bag, personal icebox) were examined. This study is meaningful in that it provides an understanding of consumers' actual preferences for the dawn delivery service, which has been receiving considerable attention in South Korea at the time of this study. However, there are only a limited number of previous studies examining these specific customer preferences. In addition, the study contributes to the exploration of consumer responses regarding their use of a personal icebox, which is a new eco-friendly packaging type with high reusability but that is not yet popular.

There are three main findings. First, consumers consider the packaging type to be more important than the delivery time option in the delivery service. Therefore, online grocery companies should improve their delivery packaging competitiveness in order to increase customer satisfaction. Second, the utility for dawn delivery is higher than that for daytime delivery and the utility for the personal icebox is perceived as stronger than those for the market cooler bag and the paper box. This indicates that online grocery companies which do not currently offer dawn deliveries and personal iceboxes among their delivery types may need to adopt them in the future. Lastly, the preferred delivery type and intensity of this preference by consumers differs according to their characteristics. For example, dawn delivery is generally more popular than daytime delivery; however, consumers in their 50s express a much stronger preference for daytime delivery. Therefore, online grocery companies should consider providing a customized delivery service to target customer groups or valuable groups.

The limitations of this study are as follows. This study focuses on examining the two factors of the delivery time and packaging type; however, there are other important factors constituting a delivery service, such as the delivery cost. For example, there are various types of shipping costs, such as free shipping on purchases of KRW 40,000 or more, free shipping on purchases of 15,000 won or more after paying a monthly subscription fee of 5000 won, and unlimited free shipping after paying a monthly subscription fee of 15,000 won. We would like to add other important factors affecting consumer preferences with regards to online delivery services in the future. In addition, this study does not focus on the factors affecting the customer preferences of the delivery types. Although it is beyond the scope of this study, there may be variables affecting customer utility for each level of the delivery attributes. Lastly, since this study focused solely on South Korea, delivery service types and the results are likely to be specific to that market. Therefore, future studies could explore or compare the customer preferences for delivery service types used in other countries.

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Informed Consent Statement: Customer consent was waived because this study included only straightforward self-report questions without any deceptions, and participants were those who were enrolled in a professional survey company and gave general consent to surveys.

Data Availability Statement: https://drive.google.com/file/d/17L2Qt8MB0uOXPNGCx6Q-W7Qq6zImiZam/view?usp=share_link.

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

Appendix A

Please assume that you want to buy fresh food from a new online mart that you have never used before. Products are delivered by a refrigerated vehicle and placed on your doorstep. Ice packs are included for refrigerated/frozen foods. The following figure describes the two delivery time options and the three types of distribution packaging (see Figure A1).

■ Delivery time

- Dawn delivery: Delivered between 12 a.m. ~ 7 a.m.
- Daytime delivery: Delivered between 10 a.m. ~ 9 p.m. Consumers select a delivery timeframe with three-hour intervals between these times.

■ Distribution packaging

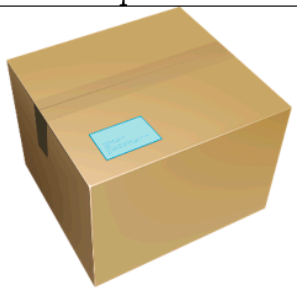
Paper box	Market cooler bag	Personal ice box
		
- Paper box - Recyclable/Not Reusable	- Insulated bag/box for a certain store - Reusable /Not recyclable	- Insulated bag/box owned by a consumer - Reusable /Not recyclable

Figure A1. Delivery time options and distribution packaging types used in the questionnaire.

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