

Article

# Competitiveness of E Commerce Firms through ESG Logistics

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**Abstract:** Rapid growth in the e-commerce market, caused by COVID-19, has led to fierce competition. The intense competition in e-commerce market triggers firms to strengthen their competitiveness by providing logistics services. Furthermore, as sustainability becomes important in consumers' choices of products or services, e-commerce companies' environmental, social, and governance (ESG) activities are becoming important. Therefore, our purpose of study is to examine the attributes of e-commerce's competitiveness in the perspective of ESG in the logistics service and to suggest differentiation strategies. We analyzed the importance of each ESG attribute in the logistics through a conjoint analysis. As a result, we found that e-commerce consumers value ESG activities in the order of distribution in the social (9.866%), partnership in the governance (9.637%), operation of distribution center in the social (8.570%), packaging in the environmental (8.320%), operation of distribution center in the environmental (8.262%), purchasing in the social (8.200%), and distribution in the environmental (7.153%). Accordingly, we suggested ESG strategies such as win-win cooperation, opening information on the working environment in delivery and distribution centers, development of a shared logistics platform, preventing COVID-19, and raising consumers' awareness of eco-friendly delivery.



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**Keywords:** e-commerce; logistics; environment; social; governance; ESG; conjoint analysis

## 1. Introduction

In line with the booming online market caused by COVID-19, e-commerce is emerging as a promising industry [1]. Korean IT portal companies such as Daum and Naver are also entering e-commerce in addition to large offline distributors due to low barriers to entry. Consequently, e-commerce companies are seeking to increase product diversity and price competitiveness and strengthen their competitiveness through platform reconstruction [2–4]. Under these circumstances, e-commerce companies are evolving into firms that include logistics service functions, as well as platform functions that link products. In addition, they are trying to secure competitiveness by introducing time concepts of existing logistics services such as same-day delivery, early-morning delivery, and 4-h delivery [5]. At the same time, as the words sustainable and ethical consumption are commonly used among consumers, and e-commerce's on the environment, social, governance (ESG) activities are becoming important, as is providing merchantability, quickness, and convenience [6]. For example, a fire at a Coupang Logistics Center in June 2021 was not simply recognized as damage to corporate property but as a poor labor environment and an avoidance of responsibility to consumers, which led to a boycott of Coupang. In other words, ESG activities in the logistics sector have become an important factor in consumers' choice of e-commerce platforms. However, there is lack of research for impact of ESG on consumer's platform choices. Previous studies have focused on how corporate ESG activities attract investors [7]. Therefore, the purpose of this study is to examine the key attributes of e-commerce's competitiveness from the perspective of ESG in the logistics sector and present a differentiation strategy through ESG. To this end, this study seeks to analyze the importance of each ESG factor in the logistics sector through a conjoint analysis based on a survey.

The contribution of this study is that, first of all, it identified the attributes which make an e-commerce entity gain competitive market advantage in the logistics sector among the criteria of ESG management. Secondly, the interest of ESG-related logistics attributes of customers using e-commerce was identified. Finally, meaningful corporate action strategies are presented regarding the important ESG factors derived.

## 2. Literature Research

### 2.1. E-Commerce Concept and Industry Status

In the past, e-commerce meant purchasing or selling information, products, and services through a computer network [8]. Gupta [9] extended this concept, viewing that e-commerce is a broad online business for products and services and is related to all forms of transactions, except physical exchange or contact. In addition, Meng [10] considered e-commerce to mean any business process that uses a computer network to realize the high-efficiency and low-cost trading of goods.

Traditional e-commerce companies in the past have played a role in providing platforms for e-commerce, but now they are building their own logistics service networks in addition to providing platforms. This is because, among the logistics services, especially the Last-mile service, it is one of the key elements for a successful e-commerce business and is needed for continuous improvement in service levels [5]. Existing e-commerce definitions lack this logistical concept, so redefining e-commerce, including logistics, is necessary. Accordingly, in this study, by combining platform elements and logistics elements, e-commerce was defined as the entire process from online ordering made through platform selection using PCs and mobile devices to actual consumers.

Recently, while e-commerce companies using logistics outsourcing have experienced delays in shipping/returns, lack of follow-up services, and inability to respond immediately to problems [5], e-commerce companies that provide their own logistics services are operating more effectively regarding these issues. This is because, through direct management, they can increase the quality and efficiency of their logistics services and respond flexibly to sudden changes [11]. In fact, Coupang, Korea's leading e-commerce company, is showing rapid growth with its own logistics services at the forefront. According to Deloitte's [12] analysis of the 250 top retailers worldwide, since 2014, Coupang has ranked first in 'the company with the highest growth rate' at an average annual rate of about 103%. It also topped the list for three consecutive years in terms of online shopping and delivery satisfaction by brands in Korea in 2020. In particular, it was found that there was an overwhelming gap of 73 points compared with the company in second place in the 'Quickness/Accuracy' category among satisfaction evaluation factors [13]. This can be seen as an example of gaining an upper hand in the market by taking advantage of providing its own logistics services.

However, many e-commerce companies, which have realized the benefits of establishing their own logistics network, are scrambling to provide logistics services, making it difficult to draw differential competitiveness in the logistics sector. For example, as Coupang began next-day delivery, companies such as Shinsegae and Naver, which are latecomers, have quickly introduced next-day delivery services, and now most e-commerce companies are already providing next-day delivery services. Meanwhile, SMEs (small and medium-sized enterprises) are seeking to secure consumers with specialized delivery services such as 'early-morning delivery' and 'four-hour delivery' to combat capital offensives by large companies, and in this situation, zero-sum games continue to take away limited pies. Therefore, to secure a customer base, e-commerce companies need to find new attributes to be competitive.

One of the attributes considered by e-commerce companies is sustainability. Companies such as Amazon, Veo, and Wal-Mart are actively promoting companies that provide sustainable goods and services [14]. The reason companies pursue sustainable brand value is because it is a new strategy to secure and maintain a customer base [15]. In particular, it is necessary to focus on ESG, which is in the spotlight. Accordingly, this study seeks

to examine the factors of consumers' selection of e-commerce platforms in the past and derive important factors of ESG in the logistics sector for e-commerce companies to be competitive in the future.

## 2.2. Competitive Factors for E-Commerce

The fierce competition between platforms in e-commerce has led to the need for a strategic approach to gain a differential competitive advantage in this market [16]. In order for e-commerce companies to increase their market share, research is needed on the attributes that consumers consider when choosing e-commerce platforms.

Meanwhile, previous studies have shown that establishing an efficient logistics supply chain in e-commerce has an impact on the success or failure of a company [17–20]. Babenko et al. [21] also suggested reliability, quality, government involvement, and accessibility as the success factors of e-commerce. These previous studies have revealed the important and essential factors required for success of e-commerce companies. On the other hand, other prior studies have suggested the important factors in terms of consumers choosing e-commerce companies. The factors that consumers consider in choosing an e-commerce platform are delivery services [4], platform usability [4], feedback mechanism [4], information security [2], reliability [3], product diversity [2], price competitiveness [3], information [22], responsiveness [22], and others. A description of each factor is in Table 1. In particular, the authors and consumers consider logistics services the most important factor in choosing e-commerce's platform.

**Table 1.** Attributes of e-commerce customer satisfaction in advanced research.

Attributes	Definition	Example
Delivery Service [2,4,23,24]	Customer attraction by providing promptness and convenience to consumers through delivery service.	Specialized delivery service, delivery lead time, delivery safety, tracking service, recognition of potential delivery delays
Platform Usability [2–4,22,24]	It can be described as the platform's accessibility, search capabilities for products, user-friendly interfaces, and impact user satisfaction.	Accessibility, web design, search support, usefulness, content visibility
Feedback Mechanism [4,22,25]	Performs a kind of certification that can be evaluated on a product through other consumers.	Reviews, comments, ratings
Information Security [2–4,22–24]	The extent to which consumers feel safe from the illegal use of personal information online.	Personal information security, personal information collection, payment information protection
Reliability [2,3,22–24]	The extent to which consumers feel that the products and transactions offered by e-commerce platforms are reliable.	Trust in transactions, trust in contents
Product Diversity [2,23,24,26]	Diversity and depth of products provided by the platform.	Capability to present alternative products, a variety of products, and specialized products
Price Competitiveness [2,3,23]	The extent to which the consumer perceives that the product has been purchased at a reasonable price.	Price comparison with other platforms, price satisfaction compared to offline transactions
Information [3,22]	How up-to-date, accurate, and complete the information is that is provided by the platform.	Continuous update of information, the accuracy of information, completeness of information
Reactivity [3,22,23]	The extent to which the platform is perceived to respond quickly and appropriately to consumer needs.	Customer response speed, customer response procedures

### 2.3. ESG

In order to secure long-term competitive advantage and sustainable growth, companies need to consider not only existing financial performance but also non-financial performance. In the past, if an entity was based on its financial indicators when evaluating the entity, the current society has grown to demand even non-financial performance, such as ESG [7]. As ESG activities have emerged as a hot topic, they have become a core of corporate management and are also emerging as clear differentiators in the e-commerce industry. These ESG activities or performance disclosures have been found to help companies attract investment [7] and grow financial performance [27,28].

Meanwhile, sustainability is becoming important in consumers' choice of goods or services [6]. This is especially true since, as the volume of traffic and pollution in the city increases due to the increase in freight volume by the e-commerce industry, e-commerce customers are also interested in sustainability [29]. So, e-commerce companies are seeking to secure new consumers and promote their value through ESG activities. However, just as the competitiveness of e-commerce companies is determined in the logistics sector, ESG activities of e-commerce companies are also performed in conjunction with the logistics sector (Table 2).

**Table 2.** ESG activities in the logistics of e-commerce companies.

	Activities	Examples
Environment	Packaging	Use reusable packaging, use recyclable packaging, avoid using additional packaging [30,31]
	Distribution (Last-mile delivery)	Reduction in air pollution and carbon emissions through Green Vehicle Routing [32], using electric vehicles or bicycles [33]
	Operation of Distribution center	Green Warehousing and introducing eco-friendly power generation [34,35]
Social	Purchasing	Ethical purchasing [36]
	Distribution (Last-mile delivery)	Using the Crowd logistics platform [37], improving the working environment (work schedules, salaries, etc.) [38], avoidance of vehicle noise and illegal parking [39]
	Operation of Distribution center	Creating local community jobs [40], improving the working environment (work schedules, salaries, etc.), avoidance of traffic congestion [41,42]
Governance	Partnership	Avoiding unfair trade practices and supporting SMES (retailers and suppliers)

#### 2.3.1. Environment

Environmental activities in logistics can be classified as the packaging, delivery, and operation of the distribution center, and environmental activities in packaging include using reusable and recyclable packaging and avoiding the use of additional packaging [30,31]. Amazon, for example, is implementing a policy of reducing waste of packaging resources by delivering products safely to consumers without additional packaging through its frustration-free packing program [43]. Moreover, 11th Street, SK's e-commerce platform, is also working on environmental activities in the logistics sector by introducing recyclable paper boxes, adhesive tapes, and vinyl buffers.

Environmental activities in the distribution sector relate to activities that reduce air pollution and carbon emissions caused by vehicle operations. E-commerce companies are introducing the Green Vehicle Routing Program to simultaneously optimize transport routes and minimize carbon emissions while introducing electric vehicles and bicycles to reduce the carbon emissions caused by delivery [32,33]. For instance, Hyundai Department Store is trying to attract new consumers by combining electric trucks with cold-chain systems and services that deliver premium fresh foods within 30 min.

Meanwhile, environmental activities are being emphasized in the operation of logistics centers, and a green warehousing strategy that minimizes energy use and maximizes space

use of centers to reduce costs and increase efficiency while using eco-friendly energy is being introduced to e-commerce companies [34,35]. For example, Amazon is trying to reduce carbon emissions by installing solar panels in idle space on the roof of its logistics center.

### 2.3.2. Social

Social activities in logistics can be classified as the purchasing, delivery, and operation of the distribution center. As e-commerce companies include not only platform functions that connect businesses and consumers but also distribution capabilities that purchase and sell products, which products to buy or sell also becomes important. Ethical purchasing by enterprises is particularly emphasized because it is the first step in consumers' ethical consumption.

Social activities in the distribution sector are related to job creation and the improvement of the working and living environments. In particular, e-commerce companies have recently provided jobs for ordinary people to deliver directly through crowd logistics such as Coupang Flex. On the other hand, there are also negative opinions about crowd logistics, as there are cases of increased traffic congestion and noise due to it.

Social activities in the distribution center management sector are related to job creation and improvement of the working environment. E-commerce companies are reinforcing their logistics networks by establishing a new logistics center and revamping their image by creating jobs in the region. For example, according to the Ministry of SMEs and Startups, Market Kurly established the Gimpo Logistics Center in 2020 and hired more than 100 workers related to the logistics center, ranking first in employment growth rate among venture companies. On the other hand, since the operation of the distribution center can cause traffic congestion around it, the location selection of the distribution center considering the nearby residents is an important factor in social activities [41,42].

### 2.3.3. Governance

Sound corporate governance is essential to corporate performance improvement and survival [44]. Meanwhile, corporate governance relates not only to the internal structure of an entity, such as the formation of a board of directors, but also to the relationships between other entities. E-commerce companies receive commissions from store companies (sellers) and are implementing open market policies to help store companies secure new customers. However, as social problems such as e-commerce companies' demand for the lowest price and high commissions have emerged, e-commerce companies have recently implemented win-win policies such as discounting fees and supporting advertising. In fact, Market Kurly has introduced a 'direct purchase system' for some stores to reduce the inventory burden.

## 2.4. Research Model

According to the other literature measuring the utility of e-commerce consumers through conjoint analysis, attributes that affect consumer utility were presented as research models. For example, Schaupp [2] schematized the research that technology factors, shopping factors, and product factors affect the satisfaction of online consumers. This study benchmarks the literature to present a research model above that ESG attributes affect consumer utility. Recently, the authors and consumers consider logistics services to be the most important factor in choosing e-commerce's platform. Therefore, we selected noteworthy attributes in aspects of logistics services and ESG activities based upon antecedent literature [29]. In the category of ESG in terms of logistics, issues in the environment, society, and governance sectors were selected as the attributes of the study to measure the utility that consumers feel. In the environmental sector, packaging, distribution, and the operation of logistics centers were used as attributes to evaluate the consumer utility, which is impacted by environmental activities of e-commerce logistics [30–35]. In the social sector, purchasing activities, distribution, and logistics center operation were used as key

attributes of social logistics, which deal with consumers' utility [36–42]. In the governance sector, it was decided to evaluate whether e-commerce companies influence consumer preferences depending on whether they maintain sound relationships with their partners. Figure 1 shows that the four categories in this study comprehensively affect the utility of e-commerce consumers.

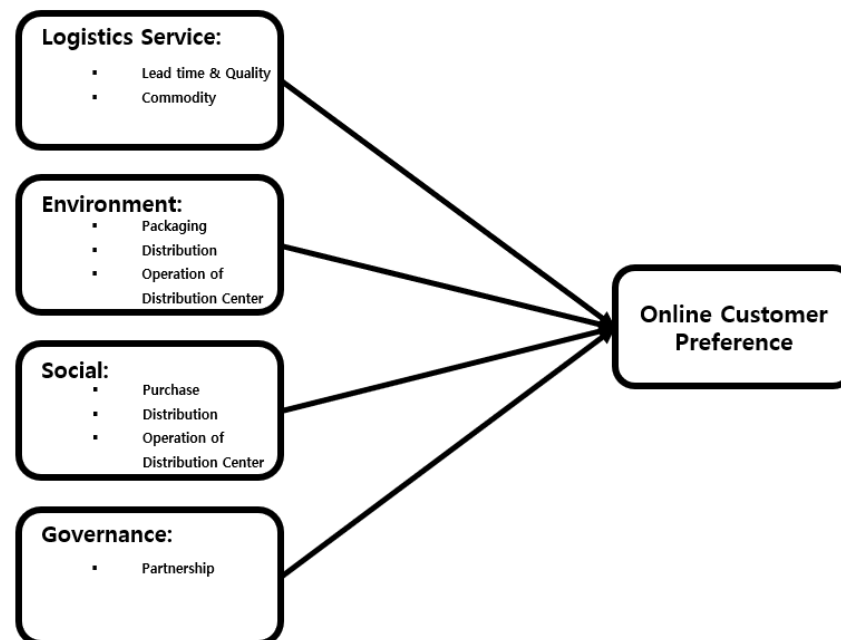


Figure 1. Research model.

Therefore, this study aims to analyze which logistics factors consumers consider important when choosing an e-commerce platform, including logistics in the service aspect, which is the most important factor to the consumer, and ESG logistics, which is a hot topic recently and what logistics and ESG strategies e-commerce company should implement in the future (see Figure 1).

### 3. Materials and Methods

#### 3.1. Conjoint Analysis

Conjoint analysis is a research method that estimates respondents' preferences and utility for a good or service, predicting which product or service they prefer. Conjoint analysis is based on the assumption that respondents judge two or more attributes collectively in assessing preferences and satisfaction with goods or services [2]. Conjoint analysis can thus create a realistic decision model by creating an environment similar to the process that real consumers choose from in the market. The conjoint analysis also characterizes the importance of relative attributes to gain a market advantage [4].

On the other hand, the model of conjoint analysis is divided according to how the level of attributes affects utility. Models are divided into vector models, ideal point models, and part-worth function models. The vector models evaluate targets for each attribute and weigh-in for their evaluation values. The ideal point model assumes that there is an ideal level for each variable and that, away from that level, the utility is reduced. For a part-worth function model, it is assumed that the increase in utility varies depending on the level of the attribute.

In this study, we used a part-worth function model assuming that the utility for the platform varies depending on the level of attributes. The mathematical equation of the  $t$ -th attribute that constitutes a part-worth function model is as follows:

$$U_t(x_{jt}) = U_{t1}D_{t1} + U_{t2}D_{t2} + \dots + U_{tr_{t-1}}D_{tr_{t-1}} \quad (1)$$

In this equation,  $r_t$  is the number of levels of different  $t$ -th attributes,  $D_{tk}$  is the dummy variable that takes 1 if  $x_{it}$  equals the  $k$ th level of  $x_t$  or 0 if not, and  $U_{tk}$  is the part-worth function factor for the  $k$ -th level of  $x_t$  [45].

### 3.2. Survey

The previously selected consumer e-commerce platform selection attributes (logistics service, environment, society, governance) were established as shown in Table 3, and 16 cards were generated through SPSS 28. To avoid the unnecessary generation of cards, cards were created using Fractional Factorial Design to prevent the predictive validity of the survey [46].

**Table 3.** Levels by attributes.

Attributes	Detailed Attributes	Levels
Service	Lead time and Quality (Last Mile Delivery) Commodity	Low, Medium, High Wide variety, Medium variety, Narrow variety
Environment	Packaging Distribution (Last Mile Delivery) Operation of distribution center	Implemented, Not implemented Implemented, Not implemented Implemented, Not implemented
Social	Purchase Distribution (Last Mile Delivery) Operation of distribution center	Implemented, Not implemented Implemented, Not implemented Implemented, Not implemented
Governance	Partnership	Implemented, Not implemented

A Full-profile approach is used to collect data to simultaneously consider multiple attributes at a time. Even though the card has a large number of attributes, this approach is simple to manage, easy to use, and does not require a complex estimation method when using a part-worth function model. However, there are disadvantages in that researchers may find it difficult to evaluate attributes that keep other attributes constant, and duplicated attributes can lead to the problem of double counting [45]. Accordingly, in order to solve the double counting problem, the respondents of the survey were asked to view the profile, give a score of 1 (Very Undesirable) to 10 (Very Preferred) for each attribute at first response, and then give a score of 1 to 100 in the second response.

### 3.3. Sample

The survey in this study was conducted on consumers who have used e-commerce. The researchers opened the survey in August 2021. The invitation of survey was sent via web forum and KakaoTalk, the most popular messenger application in Korea. The survey method was a Google Form because of the familiarity to the respondents. The total number of survey respondents was 128, and the research was based on a total of 96 surveys, excluding 31 responses with duplicate scores and one with missing values. The response rate for the survey was 67.7%.

The respondents of the survey are composed of various ages. However, most of the respondents are in the ages between their 20s and 30s, which are considered as the dominant participants in the e-commerce market. We also tested systemic difference between sex and age groups using an ANOVA test. We found no significant difference between groups. The detailed characteristics of respondents are shown in Table 4.

**Table 4.** Characteristics of respondents.

Characteristics	Categories	Number of Respondents	Ratio of Respondents
Gender	Male	40	41.7%
	Female	56	58.3%
Age	10~19	12	12.5%
	20~29	64	66.7%
	30~39	15	15.6%
	40~49	4	4.2%
	More than 50	1	1.0%
Number of E-commerce usage (Average per week)	Less than 2	60	62.5%
	2 or 3 times	31	32.3%
	More than 4	5	5.2%

#### 4. Results

The detailed attributes that consumers consider most important in choosing e-commerce platforms are lead time and quality (21.938%) in the logistics service sector, followed by commodity (18.054%) in the logistics service sector. Meanwhile, with regard to ESG, consumers recognized its importance in the order of distribution in the social sector (9.866%), partnership in governance sector (9.637%), logistics center operation in the social sector (8.320%), packaging in the environmental sector (8.262%), purchases in the social sector (8.253%), and distribution in the environmental sector (7.153%). In this study, Pearson's R and Kendall's tau values were found to be 0.998 and 0.967, respectively, showing very high explanatory power in the model. Furthermore, the model fit for the 16 combinations of these e-commerce platform selection attributes is less than 0.05, indicating that this model fits (This is set out in Table 5.).

**Table 5.** Conjoint analysis of e-commerce platform selection attributes.

Attributes	Detailed Attributes	Level	Utility Estimation	Importance (%)
Service	Lead time and Quality (Last Mile Delivery)	Low	-8.387	21.938
		Medium	-0.099	
		High	8.486	
	Commodity	Narrow variety	-7.794	18.054
		Medium variety	1.702	
Environment	Packaging	Implemented	3.199	8.320
		Not Implemented	-3.199	
	Distribution (Last Mile Delivery)	Implemented	2.751	7.153
		Not Implemented	-2.751	
	Operation of distribution center	Implemented	3.177	8.262
		Not Implemented	-3.177	
Social	Purchase	Implemented	3.153	8.200
		Not Implemented	-3.153	
	Distribution (Last Mile Delivery)	Implemented	3.794	9.866
		Not Implemented	-3.794	
	Operation of distribution center	Implemented	3.295	8.570
Not Implemented		-3.295		
Governance	Partnership	Implemented	3.706	9.637
		Not Implemented	-3.706	
	Constant		59.384	
Coefficient of Determination	Pearson's R = 0.998, significance = 0.000 Kendall's tau = 0.967, significance = 0.000			



Results for Detailed Attributes

Figure 2 shows that consumers value platforms that offer good delivery services (lead time and quality) and a variety of commodities when choosing an e-commerce platform. However, unlike the variety of commodities, respondents showed negative utility values for moderate delivery services. However, while good delivery services (8.486) and various commodities (6.092) show high levels of utility, the importance of delivery services (21.938%) is greater than commodity variety (18.054%), so providing good delivery services is more important than diversity in logistics services.

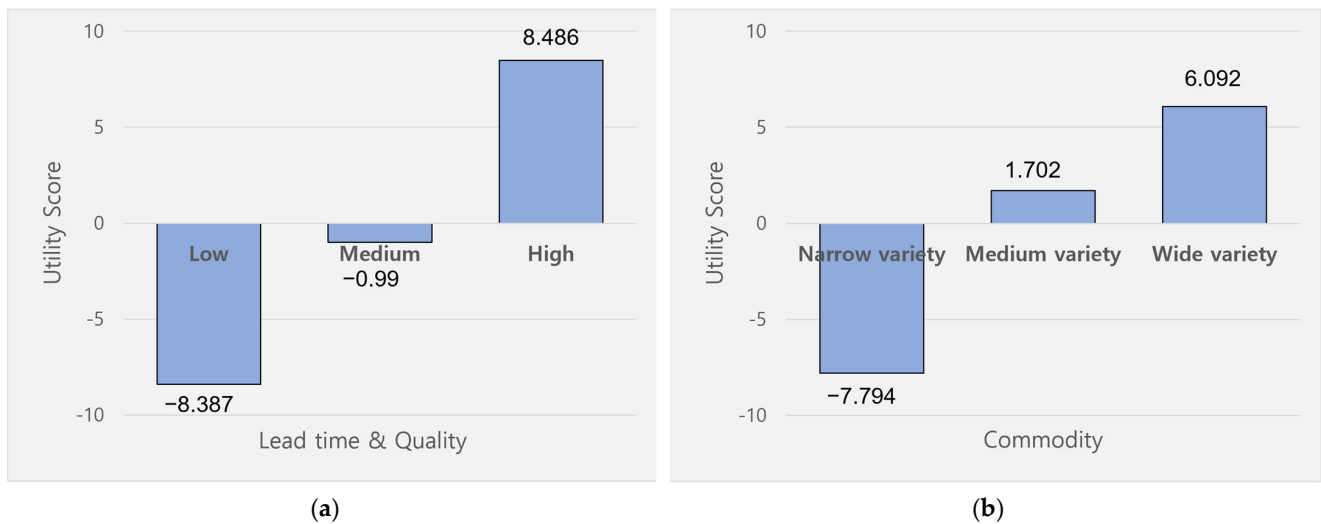
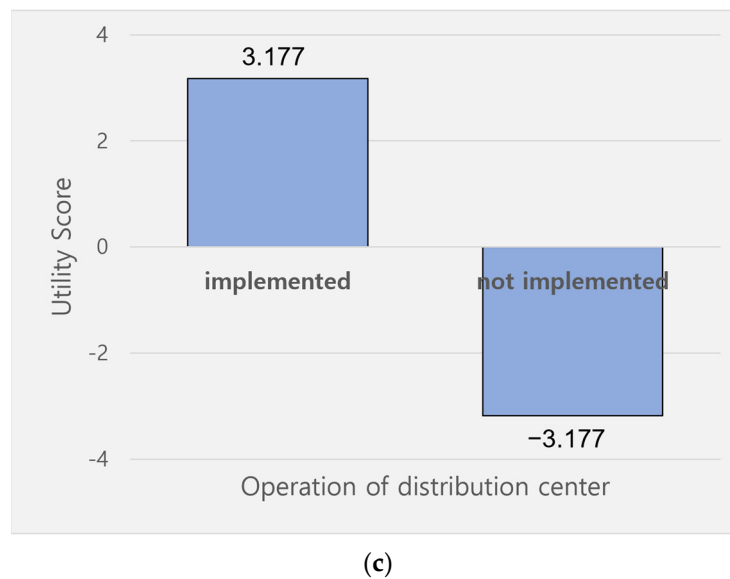


Figure 2. Logistics service utility score. (a) Lead time & Quality; (b) Commodity.

According to Figure 3, in the environment sector, respondents consider packaging (8.320%), logistics center operation (8.262%), and distribution (7.153%), which shows that respondents consider eco-friendly packaging of this commercial platform the most important.



Figure 3. Cont.



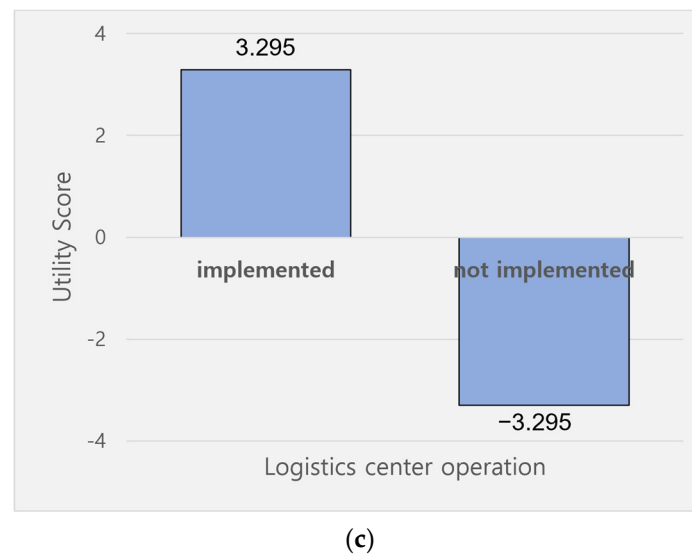
**Figure 3.** Environment utility score. (a) Packaging; (b) Distribution; (c) Operation of distribution center.

In terms of social activities, importance was derived in the order of distribution (9.866%), logistics center operation (8.570%), and ethical purchasing (8.200%) (Figure 4). The ethical purchasing of e-commerce is of lesser importance than the other two attributes but is of sufficient significance in terms of utility.

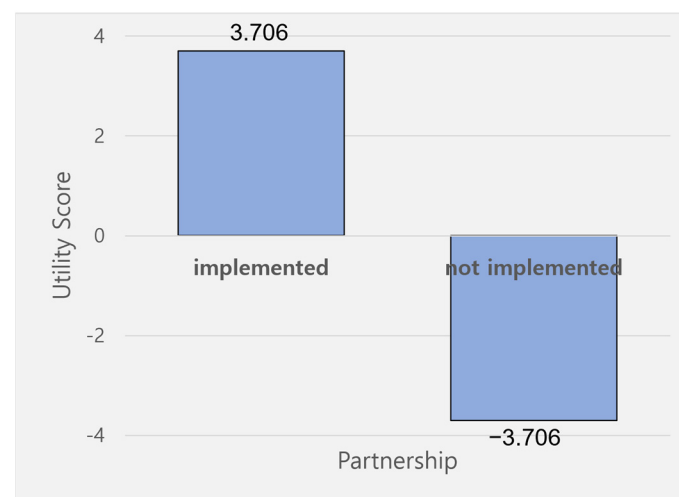
In the corporate governance sector, respondents preferred an e-commerce platform that conducts partner relationship management. The importance of partnerships (9.637%) was the second highest among ESG-related attributes, indicating that governance is also important to customers, such as environmental and social activities (Figure 5).



**Figure 4.** Cont.



**Figure 4.** Social utility score. (a) Purchase; (b) Distribution; (c) Operation of distribution center.



**Figure 5.** Governance utility score.

## 5. Discussion

As the e-commerce market grows, it has become an environment where it is no longer possible to achieve significant performance only by strengthening delivery services. Delivery services (lead time and quality) have become an essential element for e-commerce companies, and customers have become accustomed to these services, making it difficult to draw differences through only delivery services. Therefore, this study aims to pioneer a new market by presenting strategies in terms of ESG that e-commerce companies have not previously considered.

First, when looking at the governance structure, it was found that customers place significant value upon the relationship between e-commerce companies' partners when choosing a platform. In recent years, the public interest in socially asymmetric and unreasonable contractual relations has increased. Consumers avoid e-commerce companies forcing unreasonable relationships with partners with excessive advertising fees and commissions and want e-commerce companies to have win-win cooperation with partners. Accordingly, in order for e-commerce companies to improve their relationship with their partners, the following strategies can be considered in terms of governance structure.

First, e-commerce companies should preemptively secure ESG collaboration initiatives with SMEs that are sellers or suppliers. According to Schöder [29], e-commerce companies lack collaboration initiatives with SMEs despite their large investments in the environment and society. Likewise, domestic SMEs are in an environment where it is difficult to invest in ESG management due to various restrictions. The strategy of e-commerce companies to cooperate with SMEs in eco-product design and packaging can instill a positive image of the company in consumers [47].

Second, it can be a close collaboration case for e-commerce companies to provide joint logistics center services to SMEs in the process of storing high-cost products. In this case, SMEs that have difficulty investing in ESG activities can naturally match e-commerce's ESG management and stride. Looking at Naver's success in entering the e-commerce business, Naver maintains a close relationship and high delivery service with CJ Logistics in terms of logistics sector and implements a win-win strategy to provide seller-oriented fulfillment services. Therefore, through this strategy, e-commerce companies should move forward as leaders in ESG management.

In terms of social activities, the importance of delivery and distribution center operation attributes was largely derived. In particular, it can be seen that the changed consumer's perception of delivery activities was reflected. Due to issues such as the recent strike of courier workers, much social attention is being paid to the working environment treatment of delivery workers. The reason why delivery in terms of social activities shows high utility is because consumers have been exposed to these issues. Therefore, if e-commerce companies make information publicly available on the working environment of delivery, they will be able to raise consumer awareness of social activity. For example, some e-commerce companies, such as Amazon, tend to involve consumers who existed only as customers in logistics activities. As a result, consumers played the role of logistics service providers at the same time. Therefore, interest and expectations for delivery in terms of society increased. In addition, these shared logistics are an opportunity to positively secure a positive corporate image by providing transparent working environment information beyond just job creation. On the other hand, these shared logistics activities are a method that is not well used by traditional distribution companies that have newly entered the e-commerce market. Therefore, traditional retailers can use strategies to add or activate functions to shared logistics platforms to inform consumers of their social activities.

Similar to delivery, the nature of the distribution center operation on the social side can be interpreted as having an impact on consumers' choice of platform due to the recent issue of improving the working environment for workers in the distribution center. As a result, opportunities for consumers to participate in the operation of distribution centers, such as creating jobs in the delivery sector through shared logistics, will be provided as a platform, and disclosure of information will be a way to meet the utility of consumers.

On the other hand, as the COVID-19 infection of logistics center workers and the spread of infectious diseases in the community have also become an issue, it can be interpreted that the social aspect of logistics center operations is important for consumers. In particular, for e-commerce companies that operate their logistics companies, the outbreak of infectious diseases in the logistics center can greatly hurt logistics efficiency and corporate image, so it is important to prevent them. In order to achieve this, it is necessary to consider the Goods to Person method that can minimize face-to-face contact when designing the distribution center.

In choosing an e-commerce platform, respondents considered delivery to be the least important attribute in the environment sector. In addition to simply delivering using eco-friendly vehicles, eco-friendly delivery also includes improving logistic efficiency such as improving vehicle loading rates and optimizing routing. However, it is not easy for consumers to recognize the environmental impact of delivery because e-commerce companies do not actually provide information on the environmental impact of such activities. In addition, unlike the directly visible packaging, delivery in terms of environmental activities

is difficult for consumers to feel, so it can be seen that such results were derived due to its relatively low importance.

As major countries such as the U.S. and regions such as the EU accelerate eco-friendly policies, leading logistics companies such as Amazon and FedEx also declare carbon neutrality and are sparing no investment regarding eco-friendly delivery. As such, the logistics industry tends to value the environment, and eco-friendly delivery is also one of the directions that e-commerce companies should take in the future. On the other hand, e-commerce companies need to raise consumer awareness of environment activities first in order to have discriminatory competitiveness in the market through delivery in the environmental sector. For example, it is important to inform e-commerce companies and consumers that they are participating in eco-friendly delivery activities by providing various options, such as allowing consumers to choose eco-friendly delivery directly and improving loading rates, even if it takes a little longer than the standard delivery method.

## 6. Limitation and Future Research

Our study investigates securing competitiveness strategy from logistics and ESG perspectives. We acknowledge that our study has limitations that provide some opportunities for future research. First, four attributes were selected and were hypothesized to have impacts on e-commerce customer's choices. Although, these attributes are grounded from logistics and ESG perspectives, we recognize that other latent attributes influence the customer's choice. For example, if e-commerce companies are to provide discriminatory services through ESG, it leads to an inevitable increase in costs. Accordingly, in future studies, it is necessary to understand the importance of logistics costs that consumers think of and to determine how much extra they are willing to pay. Second, there was a lack of investigation on which attributes derived in this study are related to existing e-commerce platforms and on which the e-commerce company consumers were choosing. Therefore, future research will present a more practical strategy by synthesizing consumers' actual e-commerce platform selection and analysis results. Third, the analyses of individual factors such as marital status, size of household, and income were not considered in detail while conducting the research. These factors can be influential to the dependent variable of this research. For example, the income of respondents may lead respondents to consider ESG attributes when they choose an e-commerce platform. In future studies, the factors of individual respondents can be hypothesized to expand the influence on utility of the e-commerce platforms. Lastly, most of the survey samples were biased toward those in their 20s (66.7%), and the number of respondents in their 40s and 50s was very small, so there was a limit to reflecting the perception of middle-aged and elderly people in the results. Nevertheless, the recent change in consumption patterns of young people (Generation Z and millennials) has a great influence on the e-commerce market [48]. Our study shows that the young generation recognized the importance of ESG when choosing an e-commerce platform. In addition, the total sample reflected in the analysis was 96, which is reasonable to conduct conjoint analysis, but it can be seen as somewhat insufficient to generalize the research results. Therefore, in future research, various age groups suitable for Korea's population structure are considered, and more samples are collected to further increase the reliability of the study.

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