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Effects of Sustainable Development of the Logistics Industry by Cloud Operational System

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Abstract: This study explores the relationship between cloud platforms, logistics operations, and sustainable development across organizational boundaries. In the past research of scholars, there is a blank area in research on the correlation between cloud platform systems, logistics services, and sustainable development. Therefore, we took international logistics as an example, selected the customers of a cloud logistics platform in the Taiwan business network as the research object, conducted a sample survey on customers in their partner transactions, and used a structured questionnaire to collect primary data through the Internet, sending out 620 questionnaires with a total of 271 valid samples recovered. The recovery rate of good models was 43.7%. This study used SPSS and AMOS tools to analyze and test the research hypotheses. Through the empirical research results, it was found that: (1) the cloud platform was highly correlated with sustainable enterprise development (0.254); (2) the cloud platform was positively associated with logistics operations (0.837); and (3) the cloud platform, logistics operations, and organizational sustainability highly correlated (0.666). According to an empirical analysis, environmental protection proved to be the most important, followed by economic benefits, and social harmony benefits were slightly less correlated but also positively correlated. Our research found that the research and analysis of cloud-platform-related data are conducive to reducing operational risks and increasing opportunities for innovative service models. Using the service model operated by the cloud logistics platform, it is easier for enterprises to establish and maintain stable cooperative relations with external partners. Supply chain information transactions are transparent, and novel ideas and needs can be easily and quickly obtained, improving managers' decision-making and business performances, significantly improving customer service satisfaction, and gradually achieving sustainable development in the three dimensions of economy, society, and environment, as well as making critical academic contributions to application and integration in environmental and social fields.

Keywords: cloud technology; international logistics; sustainable development; customer satisfaction; brand image

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1. Introduction

In 1980, the International Union for the Conservation of Nature and Natural Resources (IUCN), the United Nations Environment Program (UNEP), and the World Wildlife Fund (WWF) jointly published the World Conservation Strategy, which defined the concept of sustainable development, stating that: "Current international research must focus on the fundamental relationships among nature, society, ecology, economy, and the use of natural resources to ensure sustainable global development." Then, in 1987, the World Commission on Environment and Development (WCED) emphasized in Our Common Future that "Sustainable development is a development that meets the present without compromising the ability of future generations to meet their own needs" [1]. Thus far, the research framework of sustainable development has been well-defined [2].

To put it more simply, the research thinking behind sustainable development is to seek a balanced and parallel development path among economic profit, social harmony, and environmental protection, that is, to create economic benefits without damaging people's daily lives and natural resources. This belief shows the importance and urgency of sustainable development and is precisely related to the theme of this paper: the international logistics industry.

The above concept of sustainable development starts with our neighbor Japan's rapid and massive move into a global market during the last century. Expanding its shipping routes to almost every corner of the world has led to the emergence of "pollution miles"—the better the economy, the worse the pollution. As a result, standardizing the international transport industry has become imperative. Japan was the first to propose the Kyoto Protocol to regulate enterprises, while the United States introduced the concept of charging for pollution. Subsequently, the United Nations held a United Nations conference in Rio and proposed the Rio Declaration and the Charter for the 21st Century as the guiding framework for sustainable development.

Implementing sustainable development seems an excellent choice in response to the current international common task of "how to do a good job in personal protection while stabilizing economic growth and minimizing the harm caused by the conflict of social values" under the threat of COVID-19. This study is based on an empirical analysis of network-specific questionnaires conducted across organizational boundaries. Its research aims to explore the collaborative relationship structure in business networks, acquire and integrate the resource capabilities of external partners, and expand the application of cloud operating systems to share network resources, that is, to help enterprises build a cloud logistics platform that is not affected by the epidemic, improve decision-making quality and transaction efficiency, and help enterprises steadily move toward sustainable economic, social, and environmental development.

1.1. Research Background and Motivation

Minimizing the frequency of group gatherings and interactions has been the fundamental consensus held by everyone during the epidemic. As a result, video conferencing and real-time messaging software have become the norm, rather than face-to-face interaction and communication. In particular, on the premise of not destroying the living environment and consuming natural resources, the research field of online transactions has become a popular subject for maintaining normal economic operations and enhancing emotional exchanges. The key lies in the development and operational application of the cloud operating system.

The so-called cloud operating system, as the name implies, realizes administrative operations in the air (online) via information technology. The main characteristics are real-time and convenience, removing traditional time and space restrictions. Based on the concept of sharing, multiple interested parties can operate on the same platform simultaneously. Furthermore, interactive communication and feedback can now be made to address problems for the first time [3].

As for the theme of this paper, Taiwan, as the operation center of the Asia-Pacific region, is focused on commercial trade and attaches great importance to the operation and development of the international logistics industry. According to data released by the Ministry of Economic Affairs, despite the impact of the epidemic, as of the end of last year (December 2021), the total export trade volume exceeded USD 150 billion for five consecutive years (the total trade volume in the past year was as high as USD 170 billion, with the electronics industry accounting for about 35%). From this, we can see the importance of international trade to our country's economic development.

Unfortunately, Taiwan's logistics industry is smaller and more dispersed than those of Europe, the United States, or mainland China. The overall logistics industry has not had a certain degree of scale economy and aggregation economy effect, resulting in a considerable overall output value. Still, the annual increase is limited (in the most recent two years, it only reached about 2.5%), and more than 40% of trade transportation is dependent on nearby mainland China. One critical problem is the lack of an effective unified management mechanism (such as the platform construction of a cloud operating system). As a result, several transactions in the logistics industry are subject to the differentiated nature of operations across goods and businesses in the processes of goods consolidation, distribution, and transportation, thus generating more transaction costs.

The research direction of this paper is to take the international logistics industry of Taiwan, an island country that has permanently attached importance to transportation and trade, as an example. From the practitioners' perspective, the goal is to follow progressive and sustainable development ideas to build a real-time and convenient unified operation platform. Its research process (internal and external) perspective focuses on meeting the needs and requirements of stakeholders from the perspective of innovation and growth, continuously innovating and learning to achieve goals, grasping timeliness and predictability, and integrating sustainable development strategies into corporate business operation, that is, by exploring and constantly improving the cloud platform operating system integration process, helping to create value propositions and delivering them to stakeholders and allowing logistics operators to conduct consistent and efficient logistics and transportation transactions. The ultimate goals are to enable Taiwan's logistics industry to have significant international competitiveness in the post-epidemic era and to provide critical academic contributions to this field's comprehensive environmental and social applications in business activities.

1.2. Research Issues and Research Objectives

Based on the above background and motivation, the purpose of this research is to address the following questions:

(1) What are the actual contents of a contemporary cloud platform?
(2) How does a cloud platform help the sustainable development of enterprises?
(3) How do we pay attention to measurement indicators through cloud platforms' practical help to assist enterprises' sustainable development?

2. Literature Review

2.1. Development of International Logistics

In academic circles, international logistics is also known as global logistics management. The research focuses primarily on transportation, storage management, scope and time, and item protection [4–6]. The main development area is realized in various countries through interactive trade and transportation [6]. The concept of international logistics is interpreted by the principles and ideals of the international division of labor, that is, the international logistics network, transportation facilities, and information exchange technology are used to realize the international global flow and exchange of commodities and raw materials by international practice to promote regional economic development and assist the optimal allocation of world resources.

According to the latest statistics released by CILT International at the end of 2021, since 2000, the economic output value of global international logistics trade has been growing at an annual rate of 5–7%. It has already reached USD 360 trillion, surpassing the tourism industry. Its supply chain has also been involved in various industrial structures (especially across multiple countries' primary, secondary, and tertiary sectors). It has become a significant player in emerging international market transactions.

In light of the importance of the international logistics industry development to enhance competitiveness, many companies and system theorists have successively pointed out through practical cases that appropriate logistics management can significantly reduce the total cost of an enterprise, accelerate the capital turnover of enterprises, reduce the backlog of inventory, and promote higher margins, all of which can bring about many economic efficiencies [7–10]. Therefore, logistics is generally referred to as the "final boundary of cost reduction" in the world. It is the "third source of profit" after reducing raw material consumption and improving labor productivity. In particular, various scholars have suggested that organizations that meet economic, social, and environmental requirements can achieve higher market sustainability [11]. This concept is the core issue of this paper.

Nevertheless, by re-examining the past decade (2011~2021), with the rapid development of international logistics, we found that more and more attention has been paid to the study of logistics management, especially the significance of information sharing through cloud technology platforms [10,12,13]. Still, few scholars have discussed the operational relevance and application value of sustainable development from the perspective of the logistics industry combined with cloud operation.

2.2. Cloud Operating System Thinking

The National Institute of Standards and Technology (NIST) of the United States defines cloud computing as a model characterized by (1) on-demand, (2) anytime, anywhere, and (3) convenience. A shared pool can be accessed, and computing resources can be configured through the network. Therefore, this "resource-sharing platform" includes hardware infrastructure, software, and a business model, all of which can be shared [3]. The key lies in the flexible allocation of resources through virtualization technology.

Research scholars use the term "cloud-sharing platform"; based on resource sharing, online transaction operation integration through network interaction technology has largely replaced traditional physical store services and transaction behavior [14]. In particular, extensive information sharing and powerful mutual assistance can provide business operation processes with more potential for sustainable development.

The platform's specific construction and operation processes involve several related companies storing data in the public database. Then, the three services of cloud platform computing, including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS), are implemented through IaaS, PaaS, and SaaS programs.

Today, the cloud operating system has dramatically changed people's daily lives, and many organizations benefit. However, few researchers have paid attention to the impact of this model on assisting enterprises to enhance sustainable development. From the perspective of a logistics operator, Arch Shaw, the originator of logistics management, pointed out in Some Problems in Market Distribution that logistics transportation has always had a severe information asymmetry problem [15]. The core of this problem lies in the lack of good communication in the transaction interaction process, and both sides of the transaction cannot carry out dialogue based on the same information. Therefore, although the circulation process of logistics trade involves creative demand activities and market logistics activities of enterprise products, these enterprises cannot reduce costs or improve competitiveness. Therefore, in terms of logical relationships, Arch Shaw believes that creative demand activities drag down logistics activities, resulting in the inefficiency of enterprises. He proposed the three logistics principles of "balance", "interdependence", and "coordination" as the keys to correcting such issues. These principles are also the original intention of constructing a shared cloud platform [16].

2.3. To Assist the International Logistics Industry in Achieving Sustainable Development with a Cloud Operating System

Since the Rio Declaration, the concept and implementation of sustainable development have long been an important topic in many countries. With the continuous improvement of modern science and technology, practical experience has been gained in the three aspects of sustainable development, including economic profit, social harmony, and environmental protection.

This corresponds to the central research axis of this paper. First, in terms of the international logistics industry, past research scholars have demonstrated through empirical analyses that the operation and application of cloud systems can significantly improve the brand image of enterprises [17]. Particularly in logistics transactions, users' independent online processes can enhance their transaction convenience and improve customer satisfaction through open and transparent operation settings. Scholars have also said that, in addition to significantly improving the management effectiveness of logistics operators, cloud operation can effectively enhance corporate brand images. Keeping users happy brings more revenue to a business [18].

Second, regarding the correlation between cloud operating systems and sustainable development, environmental protection has confirmed that cloud technology can directly reduce carbon emissions and the fuel emissions associated with traveling back and forth between transactions [19–21]. Translated into currency, the savings in pollution remediation costs are almost half the transport transaction cost. Regarding economic profits, researchers have pointed out that all the large, international logistics enterprises worldwide have complete cloud operating systems [6,22]. The annual reports of these enterprises show that the frequency of users consulting, trading, and providing feedback through the cloud system is increasing annually, and the total number of actual trading orders is also showing a positive trend, thus demonstrating the economic benefits obtained by the cloud system. Finally, regarding social harmony, scholars have shown that cloud-based operating systems can improve the corporate brand images of logistics and employee efficiency [23,24]. At the same time, because of the close network relationship, both sides of the transaction can interact and communicate anytime and anywhere to form an excellent cooperative atmosphere. The sustainable development value subsequently generated is particularly considerable.

3. Methodology

Referring to the literature and responding to the research direction of this paper, the research framework of this paper starts by satisfying customers' usage needs and then discusses the benefits of cloud operating systems for international logistics operators in the following three aspects: economic profit, environmental protection, and social harmony, with the concept of sustainable development.

The overall research framework (shown in Figure 1) and research assumptions are as follows:

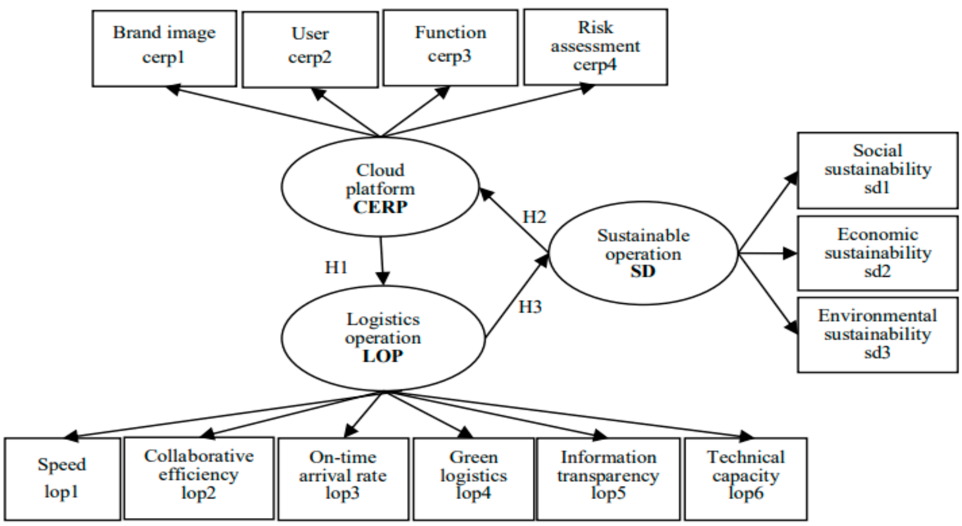

Figure 1. Research framework.

Hypothesis 1 (H1). *Cloud platform services have a significant positive impact on organizational logistics operations. That is to say, this paper believes that cloud platform processes can help organizations better conduct their brand image, user, function, and risk assessment operations.*

Hypothesis 2 (H2). *Cloud platform services have a significant positive impact on the sustainable operation of an organization. That is to say, this paper believes that the sustainable development of society, economy, and environment can be effectively used as an essential indicator for enterprise organizations to construct and improve cloud logistics platforms.*

Hypothesis 3 (H3). *Logistics operations significantly positive impact the sustainable process of an organization. That is to say, this paper believes that the speed, synergy efficiency, accuracy rate, green logistics, information transparency, and technical capabilities of a cloud platform can help enterprises and organizations achieve better sustainable development results.*

In terms of research methods, this paper used a structured questionnaire specific to web services to collect data (such as that in Appendix A). The interviewees were users of the company platform. The sampling of research objects covered two aspects and two stages. First was the pre-test stage, which was used to check the credibility of this questionnaire. The object was 42 senior executives or purchasing personnel responsible for relevant business contacts with suppliers with rich practical experience in the cloud platform. Their expertise could judge the importance of the platform application environment factors and their organizational influence, better align the measuring questions with the research topic, and carry out project analysis and tentative reliability analysis. As a result, the validity was improved by modifying the question content, arrangement appropriateness, and semantic fluency, as well as deleting undiscriminating questions. Through measurement and research, the reliability of the questionnaire reached 0.9, which met the standard and allowed us to enter the second stage of the formal questionnaire survey. The second stage of the formal questionnaire study was conducted, and 620 logistics cloud platform users were surveyed through the network. A total of 279 questionnaires were collected, but eight invalid ones were excluded. Therefore, we obtained 271 valid questionnaires, with an effective recovery rate of 43.7%. There were no missing data and zero variance or grades-related problems. Furthermore, after pretreatment, the data were standardized.

The content of the answers in the questionnaire was based on the Likert Scale. We used survey-based techniques to collect raw data. An online questionnaire and data collection took respondents from different job fields into account and conducted a cross-sectional study of 2020 organizations. For this particular study, we used a 5-point Likert scale including strongly disagree (coded 1), disagree (coded 2), neutral (coded 3), agree (coded 4), and strongly agree (coded as 5) after knowing the exact distance between two consecutive parameters [25].

We defined the independent, dependent, and intermediary variables in the research, respectively, and design relevant measurement sub-dimensions according to the nature of different main dimensions to suit the research purpose and framework of this paper, as well as to propose that the cloud logistics platform was mainly designed for service content and guidance. Based on three measurement dimensions and several indicators, such as cloud platform, logistics operations, and sustainable development, we formed operational definitions of the research variables and used the literature to establish measurement questions. The design explored the relationships between these dimensions.

First, the independent variable was the cloud platform aspect, which contained four sub-dimensions, including brand image, users, functions, risk assessment, as well as several metrics. Overall evaluation and self-identification measured the corporate image, user functions, operability and dependencies, and consideration of the platform system risk perception. Secondly, the dependent variable was the sustainable operation of the enterprise, including three sub-dimensions of society, economy, and environment and several measurement indicators, which measured user cognition and benefit of the economic, social, and environmental sustainability brought by logistics operation. Finally, the intermediate variables were essential logistical operations in the supply chain. It contained six sub-dimensions of speed, coordination efficiency, accuracy, green logistics, and information transparency, which were used to measure the technical ability of users to bring benefits and performance to logistics operations. According to the definition of the United Nations and the opinions of relevant theorists, several measures were taken, focusing on the importance and practicality of logistics operators to economic benefits, social harmony, and environmental protection. In summary, the research questionnaire design involved the operational definition and measurement of variables, as shown in Table 1.

Table 1. Operational definition and measurement of variables.

Facet	Latent Variables	Operational Definition	Measurement Item	Literature Sources
Cloud platform (CORP)	Corporate image (cerp1)	Overall evaluation and self-identification of corporate image	1. Strategic Goals and Objectives (ci1)	[26–30]
			2. Communication Implementation (ci2)	
			3. Corporate Brand Image (ci3)	
			4. Business Process Reengineering (ci4)	
			5. Information Transparency (ci5)	
	User (cerp2)	Measuring user operability and trustworthiness	1. User Interface (pf1)	[10,31–33]
			2. Selection of Vendor (pf2)	
			3. Training of User (pf3)	
			4. Trust in Vendor (pf4)	
			5. Project Team (pf5)	
			6. Flexible and Expandability (pf6)	
	Technological factors (cerp3)	Measuring whether the function can meet the basic needs of users	1. CLP Infrastructure (tf1)	[34–38]
			2. Convenient Operation of Function Options (tf2)	
			3. Functionality (tf3)	
			4. Data Integrity and System Testing (tf4)	
	Risk assessment (cerp4)	Measuring users' perceptions of platform system risk and their consideration of risk	1. Trust in Vendor (risk1)	[39–45]
			2. Information Transparency and Accuracy (risk2)	
			3. Create Corporate Advantage (risk3)	
			4. Risk Assessment Procedures (risk4)	
			5. Value Co-creation and Risk Diversification (risk5)	
			6. Regulatory Risk Protection (risk6)	
			7. Compensation Burden (risk7)	
			8. Safety Control and Responsibility (risk8)	
Sustainable development (SD)	Social sustainability (sd1)	Measuring users' perceptions of the social sustainability and benefits of logistics operations	1. Social Sustainable Corporate Philosophy (sp1)	[10,46–52]
			2. Social Network (sp2)	
			3. Societal Obligations (sp3)	
			4. Ethical Commitment (sp4)	
	Economic sustainability (sd2)	Measuring users' perceptions of the economic sustainability and benefits of logistics operations	1. Infrastructures and Stakeholders (ecop1)	[15,53–58]
			2. Capital Project Performance (ecop2)	
			3. Stakeholder Obligations (ecop3)	
			4. Just-In-Time Practices (ecop4)	

Table 1. *Cont.*

	Environmental sustainability (sd3)	Measuring users' perceptions of the environmental sustainability and benefits of logistics operations	1. Industrial Ecology (ep1)	[19,22,59–63]
			2. Environmental Regulations (ep2)	
			3. Continuous Green Procurement (ep3)	
			4. Sustainable Growth (ep4)	
			5. Green Supply Chain Management (ep5)	
			6. Business Ecosystem (ep6)	
Logistic operation (LOP)	Logistics operation performance (lop)	Measuring users' perceptions of the benefit and performance of logistics operations	1. Sustainable Performance and Stable Service (lop1)	[48,64–71]
			2. Organizational Collaboration (lop2)	
			3. Effectively Control Orders and Inventory (lop3)	
			4. Environmental Impact (lop4)	
			5. Sustainable Growth (lop5)	
			6. Just-In-Time Practices (lop6)	

As shown in the table, this paper divided the measurement dimensions into three parts according to the argument structure, cloud platform sustainable development, and international logistics operation. Then, the relationships between these dimensions were discussed by referring to the research and design of different sub-dimensions and measurement indicators of relevant theorists.

First, referring to relevant theorists, the cloud platform was divided into four sub-dimensions and several measurement indicators. This paper mainly focused on the benefits of a cloud platform for improving enterprise image and users' actual feelings in the operation process, as well as whether the function settings of the cloud platform were sound, and then evaluated the information risks that the cloud platform may cause an enterprise's operation processes.

Secondly, in terms of sustainable development, the cloud platform was divided into the three sub-dimensions of economy, society, and environment using several measurement indicators according to the definition of the United Nations and the opinions of relevant theorists The paper mainly focused on logistics operators' importance and the practice degree of logistics operators for economic profit, social harmony, and environmental protection.

Finally, in terms of logistics operation, performance was taken as the secondary dimension, supplemented by several measurement indicators to discuss the operation and application processes of logistics operators through a cloud platform, aiming at the economic profit, social harmony, environmental protection, information interaction, and communication mentioned in the literature above and practical benefits to improve the operational efficiency of enterprises.

4. Research Design

4.1. Basic Data Statistical Analysis

According to the demographic statistics results of the 271 interviewees, most of them were aged 41–45 (40.6%) and 36–40 (35.4%); 31.4% of the interviewees worked in the traditional manufacturing industry and 18% in the service industry; 74.6% had more than five years of experience in using cloud logistics platforms, and 69% had a master's degree or above. Furthermore, 18.1% of the 271 interviewees were from companies with less than ten employees, 30.6% were from companies with 11–100 employees, 22.5% were from medium-sized organizations with 101–600 employees, and 28.7% were from organizations with more than 601 employees. Regarding job attributes, 29% of interviewees were in the business field; 22.7% were in the administrative area; other sectors accounted for 24.8%, manufacturing for 11.7%, and procurement for 2.3%. Small- and medium-sized enterprises generally included international logistics talents in the procurement department. The data showed that most SMEs focused on core competency research and development rather than creating necessary labor value.

These respondents also had different job roles. Middle or senior management personnel influence decisions and play a vital role in implementing organizational strategy. Table 2 shows the implementing organizations and the parts of interviewees in their respective organizations. Of the interviewees who used cloud platforms, 49.2% were senior executives, 31.7% were middle-to-low executives, and 19.1% were essential staff. Among the 271 interviewees, 55% had cloud service requirements, and 23% were cloud consultants or researchers. The proportions of interviewees using cloud logistics platforms due to customer and process operation requirements were 7% and 8%, respectively.

Table 2. Comparison of cloud platform service types and user ranks.

	Rank			
	Basie Staff	**Middle–Low-Level Executives**	**Senior Executives**	**Total**
1. Infrastructure as a Service (IaaS)	11	24	47	82
2. Software as a Service (SaaS)	20	36	44	100
3. Platform as a Service (PaaS)	21	26	42	89
Total	52	86	133	271
Proportion	19.1%	31.7%	49.2%	100%

In addition, as shown in Table 3, the interviewees were divided into three user categories, with 30.2% of the respondents using IaaS, 36.9% using SaaS, and 32.8% using PaaS. In the traditional manufacturing industry, 31.4% used Platform as a Service, and 12.9% used IaaS. This figure reflects Taiwan's manufacturing industry actively investing in industry 4.0 smart manufacturing. In the service sector, 18.1% used cloud services, 6.6% used PaaS, and 11.8% used cloud services in the tech industry.

Table 3. Attribute ratios of cloud platform service personnel.

Cloud Service Type	Consultant or Search	Customer's Requirement	Requirements of Process and Operations	Requirements for Cloud Services	Others	Total	Proportion
Infrastructure as a Service (IaaS)	23	9	5	38	7	82	30.2%
Software as a Service (SaaS)	18	5	10	60	7	100	36.9%
Platform as a Service (PaaS)	22	4	8	50	5	89	32.8%
Total	63	18	23	148	19	271	100%
Proportion	23%	7%	8%	55%	7%	100%	

4.2. Reliability Analysis

The first analysis stage (study 1) focused on retaining relevant and well-knit items. The second analysis stage (study 2) explored the structural elements of existing elements. Finally, in the third stage (study 3), sample data different from the two steps above were used for a validation analysis to retest the convergence and differentiation of the factor structure. On this basis, the project analysis and tentative reliability analysis were carried out. KMO values vary between 0.1 and 1. The sampling is sufficient when the KMO value is between 0.8 and 1.0. KMO values between 0.7~0.79 are tolerable, and values between 0.6~0.69 are mediocre. KMO values greater than 0.6 indicate inadequate sampling and that remedial action should be taken. If the value is less than 0.5, the factor analysis results undoubtedly are not unsuitable for data analysis. If the sample size is 300, the average commonality of the retained items has to be tested. An average value > 0.6 is acceptable for sample sizes < 100, and an average value between 0.5 and 0.6 is acceptable for sample sizes between 100 and 200 [55,56]. The Bartlett Sphericity test results of the data in Table 4 showed that these problems had common factors (x^2 = 281.619, df = 55, $p < 0.001$), and the KMO was 0.870, indicating that the data were suitable for factor analysis.

Table 4. KMO and Bartlett tests.

Kaiser–Meyer–Olkin Test Measure	Measure of sampling adequacy	0.870
Bartlett's Sphericity Test Measure	Approximate chi-squared distribution	281.619
	Degree of freedom	55
c	Significance	0.000

In addition, as shown in Table 5, commonality refers to the part of a question explained by factors. A principal component analysis was initially adopted, and the initial commonality was 1. After retaining two elements, when each question was presented, the smallest was user 5, with a value of 0.489, so the variation in the questions explained was more significant than 0.5, except in the case of user 5.

Table 5. Commonality analysis.

	Initial	**Extracted**
Corporate image 1	1.000	0.687
Corporate image 2	1.000	0.790
Corporate image 3	1.000	0.728
Corporate image 4	1.000	0.636
Corporate image 5	1.000	0.627
User 1	1.000	0.700
User 2	1.000	0.720
User 3	1.000	0.739
User 4	1.000	0.696
User 5	1.000	0.489
User 6	1.000	0.745

4.3. Test of Offending Estimates

Before evaluating the fitness of the model, we first checked the estimated coefficient for whether there was a problem with offending estimates and whether it exceeded the acceptable range—that is, the model should not have inappropriate solutions. According to a previously established definition [25], three phenomena commonly occur in offending estimates: (1) there are negative error variances; (2) the normalized regression-weighted coefficient exceeds or is too close to 1 ($\geq$0.95); or (3) there is too much standard error. For example, suppose the measurement error of a specific variable is too large. In that case, the measurement problem should be solved first, and the estimation of parameters should be reviewed, rather than rashly conducting a fitness test. Even if a model fits pretty well with the sample data, this does not necessarily mean that the model is good. Whether the model is reasonable also depends on whether all the parameter estimates can be reasonably explained within an affordable range or, in other words, whether the whole model can be well-described theoretically. As can be seen from the Table 6 variances, (1) the estimated value of the error variances (e^1–e^{22}) in the model was between 0.059–0.219 without negative error variances; (2) the standardized regression coefficient exceeded or was too close to 1 ($\geq$0.95); and (3) there was not much standard error. Therefore, this study had no problem with offending estimates.

Table 6. Difference analysis.

	Estimate	SE	CR	*p*
Cloud platform_CERP	0.215	0.025	8.548	***
e^{21}	0.060	0.011	5.580	***
e^{22}	0.050	0.010	5.246	***
e^1	0.082	0.009	9.161	***
e^2	0.059	0.007	7.946	***
e^3	0.082	0.009	9.140	***
e^4	0.117	0.012	9.997	***
e^5	0.192	0.018	10.521	***
e^6	0.151	0.015	10.195	***
e^7	0.219	0.021	10.534	***
e^8	0.173	0.017	10.245	***
e^9	0.128	0.014	9.406	***
e^{10}	0.135	0.014	9.755	***
e^{11}	0.107	0.012	8.860	***
e^{12}	0.090	0.010	8.729	***
e^{13}	0.092	0.011	8.401	***

Note: "***" means significant at the significance level of 0.001.

In addition, we estimated the standard error and Z-value from the standardized path coefficient value. The normalized path coefficient was the intensity of influence of one construct on another, where the estimate was the normalized path coefficient, Std. Err was the standard error, Z-value was the test value, and (>|Z) was the probability value of significance (*p*-value of the general test). A result of $p < 0.05$ meant that the influence of one construct on another was significant, and $p >= 0.05$ meant that the influence of a construct was not significant. The path coefficient of the x construct form was 0.28, z = 9.38, and $p < 0.001$. This finding indicates that x had a significant cause; it explains the influence on m because it explains the validity and reliability of each path and provides evidence for poor overall fit [72]. Therefore, it can be concluded that the overall model did not have the problem of offending estimates.

4.4. Evaluation of Overall Model Fit Index

Evaluating the overall fit model is necessary to verify a model's hypothesis. This study discusses whether the positive and negative directions of the signs of the path coefficients of the relationships between potential variables are the same as the expected direction of the study, whether the parameter estimation value of the path coefficient is statistically significant—the absolute value of the parameter estimate must be greater than 1.96—and whether the R2 squared value of each structural equation is substantial—the more extensive the R2 squared value, the better (preferably greater than 0.05). According to the three types in the overall model and the fitness index check table, all the fit indices conformed to the demands of general academic study. The model constructed by the H0 nihilistic hypothesis was found to match the sample data and, thus, must be accepted.

However, at present, we can see that the χ^2 value was more significant, likely because the number of samples collected was also more critical, and χ^2 was proportional to the number of samples collected, so the calculated chi-squared value was more meaningful, resulting in it being significantly less than 0.05. The nihilistic hypothesis should be rejected, indicating that our model had no matching data. However, such a conclusion would be too arbitrary since scholars have put forward this question. Because of the large sample size, χ^2 became fat and grew meaningless, so the *p*-value was less than 0.05, causing us to misjudge and reject the nihilistic hypothesis.

Therefore, we believed this sample was suitable because the $\chi^2 < 0.05$ H0 nihilistic hypothesis model could not be established. However, the results here were not as good as we would have liked because the smaller the fluency, the better. However, it is worth noting that, since the chi-squared test itself is susceptible to the size of the sample, such problems have been mentioned by scholars in the past, so for scholars to use χ^2 to judge whether there is a match is inappropriate; the chi-squared value is not recommended to be referred to alone, but also the size of the sample should also be considered. Therefore, using the ratio of the chi-squared value to the degree of freedom (i.e., normed chi-squared) was suggested to replace the chi-squared value to verify the model's fitness. It is recommended that the χ^2/df chi-squared degree of freedom ratio should be between 1 and 5, preferably less than 3. In this study, the chi-squared value was 156.015, and the significance was 0.000. Although it showed that the fitness of the model and data were not good, the ratio of the chi-squared value to the degree of freedom (CMIN/DF) was 2.516, which was less than 3 [73]. Kline indicated that the fitness of the model and data were acceptable, except that the CN value was 141, which was lower than the standard value of 200, and the AGFI value was 0.884, which was close to the average weight of 0.9 [72]. Overall, all three indicators showed that our model could fit these data, and any analysis made in the future would be acceptable. It showed that the covariant structure of the conceptual model was consistent with the covariant form of the actual sample data, and this model was well-matched.

Regarding structural model inspection, the results of measuring the model were satisfactory. The fit indices of the structural model were as follows: chi-squared/df = 2.18; normed fit index (NFI) = 0.91; relative fit index (CFI) = 0.93; Tucker Lewis fit index (TLI) = 0.92; incremental fit index (IFI) = 0.91; and root mean square error of approximation (RMSEA) = 0.06. Hypothesis testing was performed based on the statistical significance of the beta value of the hypothesis path analysis. In the major stage of the analysis, we tested the impact of the self-cloud platform and logistics operations on organizational sustainability, both of which positively impacted organizations' sustainable operations. Therefore, both H1 and H2 were supported. The self-efficacy predictor's influence ($\beta = 0.160$, $p < 0.05$) was greater than that of the self-influence factor. The results of the hypothesis testing showed that cloud platform services promoted the real-time visibility of data, thus connecting key stakeholders and allowing organizations to proactively manage supply chain cloud platform services to realize the unity of complementarity between views [74].

The parsimony-adjusted measure had the following main indicators: the PRATIO (parsimony ratio) was 0.795, which was higher than the expected threshold value of 0.5, indicating that the number of estimated parameters was minimal. The parsimony-adjusted normed fit index (parsimony-adjusted NFI), which is the simplified, modified baseline fit index, was 0.941, higher than the standard value of 0.9, indicating that the number of estimated parameters was quite small. The root mean square error of approximation (RMSEA) is the degree of difference between the theoretical and perfect models. Its value was 0.075, while $0.05 < \text{RMSEA} < 0.08$, indicating good model fitness [75]. Furthermore, the value of the fitness of the SRMR model was 0.040, lower than the standard value of 0.6, indicating that the model had good fitness [76].

Model fit test statistic, degree of freedom, chi-squared *p*-value, and goodness of fit were all used to judge whether the data were consistent with the theoretical model. The chi-squared test of (χ^2): χ^2 tests the following hypothesis: the model implied the difference between the covariance matrix and the original covariance matrix. Therefore, non-significant differences are preferred. To make the selected SEM fit best, the χ^2 test is ideal, where $p > 0.05$ [76–78]. One should not pay too much attention to the χ^2 test because it is susceptible to sample size and is not comparable between different SEMs [76,77,79–81].

AMOS model evaluation showed that the CFA estimation results of the five structures had a good goodness of fit index (GFI) = 0.951. The goodness of fit index after adjustment (AGFI) was 0.922; the comparison fit index (CFI) was 0.986; and the standardized root mean square residual (SRMR) was 0.027, thus demonstrating model stability [82]. The overall model fit value of the χ^2 statistic (χ^2 = 95.243, DF = 318, $p < 0.001$) was 1.642, less than the maximum value of 3.00 suggested by Kline (1998). Based on the study of the evaluation results of the AMOS structural model (as shown in Table 7), which contained the estimated path coefficients and associated path T-values, all the other research assumptions were supported by the standardized estimates and associated *p*-values.

Table 7. Reference table of overall model fit (after modification) index.

Statistical Check Quantity		Standard Value	Research Model	Test Results
Absolute fit index	X^2	The smaller, the better ($p \geq \alpha$) $p = 0.05$	95.243 ($p = 0.001$)	Rejected
	X^2/df	Less than 3	1.642	Supported
	GFI	Greater than 0.9	0.951	Supported
	AGFI	Greater than 0.9	0.922	Supported
	RMR	Less than 0.08	0.010	Supported
	SRMR	Less than 0.08	0.027	Supported
	RMSEA	Less than 0.08	0.051	Supported
Incremental fit index	NFI	Greater than 0.9	0.964	Supported
	NNFI(TLI)	Greater than 0.9	0.981	Supported
	CFI	Greater than 0.9	0.986	Supported
	RFI	Greater than 0.9	0.952	Supported
	IFI	Greater than 0.9	0.986	Supported
Simplified fit index	PNFI	Greater than 0.5	0.717	Supported
	PGFI	Greater than 0.5	0.606	Supported
	PRATIO	Greater than 0.5	0.744	Supported
	CN	Greater than 200	218	Supported

5. Results

The parameter estimation status of the overall model in this study is shown in Table 7, the reference table of overall model fit (after modification) index. The estimated values of each parameter are explained below.

5.1. Cloud Platform Dimensions

The cloud platform included four sub-dimensions: brand image, user, function, and risk assessment. The estimated load of users was the largest, 0.890, and the T-value was more significant than 17.095, thus reaching significance. The R2 value ([SMC]) was 0.725, more significant and indicating that it was capable of interpretation. The estimated load values of brand image, functionality, and risk assessment were 0.851, 0.852, and 0,787, respectively. All the T-values were also greater than 1.96, reaching a significant level for the importance of flexibility, convenience, and functionality to the business module users. Regarding R2, brand image, functionality, and risk assessment were 0.725, 0.727, and 0.620, respectively. All the R2 values were more significant than the ideal standard of 0.4, indicating solid explanatory ability. In addition, by comparing the load of factors of each dimension, users (0.890) were the most critical factor for consumer cognition of the cloud platform, followed by functionality (0.852) and brand image (0.851). However, risk assessment (0.787) was relatively low. These results suggest that such critical factors as users and functionality should be valued to enhance consumer awareness of a company's cloud platform. The corporate image must inspire noble dedication to the brand. Sustainability can be conveyed through a corporate brand in decision-making and has a positive idea for the enterprise organization. Biel holds the view that the image of a product or service provider is the corporate image and is, thus, transformed into brand equity [83]. In this process, the corporate image enhances confidence, as proposed by other scholars [25,26]. In addition, the relatively low value of risk assessment (0.787) indicated that enterprises generally have a weak cognition of risk assessment for cloud systems, which is also in line with previous studies. Improper risk control and uncertain factors may affect the operations of organizations or cause risk factors of supply chain rupture [28].

5.2. Sustainable Development

The sustainable management dimensions included economic profit, environmental protection, and social harmony. The estimated load value of the ecological size was 0.853, the highest among all the sub-dimensions. The R2 value was 0.727, much higher than 0.4, indicating that it was very explanatory. The estimated values of the social and economic factors were 0.832 and 0.839, respectively, and the T-values between 10.492~11.019 were also higher than l.96, reaching a significant level. In terms of R2, the three sub-dimensions were much higher than 0.4, indicating they were very explanatory. Regarding consumer perception of sustainable development, environmental protection (0.853) was the critical factor for enterprises' sustainable development. The second factor was economic profit (0.839); the lowest was social harmony (0.832).

In the overall model parameter estimation table in Table 8, the path coefficient from the cloud platform to the logistics operation was 0.837. The T-value was 9.722, which was higher than the standard 1.96, indicating that the estimated value of the path coefficient was significant. This study showed that the higher the consumer's recognition of the enterprise cloud platform, the higher the consumer's dependence on logistics operations. Secondly, the sustainable development path coefficient of the cloud platform was 0.254. The T-value was 2.786, which was higher than the standard 1.96, indicating that the estimated path coefficient was significant, and the higher the consumer's recognition of the case company's cloud platform, the higher the consumer's trust in the sustainable development of the case organization. The sustainable development path coefficient of the logistics operations was 0.666, and the T-value was 5.594, higher than the standard value of 1.96, indicating that the path coefficient estimate was significant. The higher the consumer's recognition of the case company's cloud logistics operations, the higher the organization's sustainable development practices. Therefore, through the combination of theory and practice, the above three observation indicators could be used as an optional optimization model for logistics operators to strengthen sustainable organizational development. These studies are critical for improving the operation and application of cloud platforms and for enterprises to move toward sustainable development standards.

Table 8. Parameter estimation table of the overall model.

Parameter			Regression Weighting Coefficient	Standard Error	T-Value	Error Variance	Multivariate Squared Correlation
cerp1	←	Cloud platform	0.851	0.121	17.095	0.082	0.725
cerp2	←	Cloud platform	0.890	0.116	18.338	0.059	0.792
cerp3	←	Cloud platform	0.852	0.122	17.132	0.082	0.727
cerp4	←	Cloud platform	0.787	0.129	15.131	0.117	0.620
lop1	←	Logistics operation	0.714	0.098	11.160	0.192	0.510
lop2	←	Logistics operation	0.770	0.098	11.661	0.151	0.592
lop3	←	Logistics operation	0.725	0.109	11.084	0.219	0.526
lop4	←	Logistics operation	0.763	0.104	11.527	0173	0.583
lop5	←	Logistics operation	0.825	0.106	12.012	0.128	0.680
lop6	←	Logistics operation	0.806	0.102	12.061	0.135	0.650
sd1	←	Sustainable development	0.832	0.088	10.755	0.107	0.692
sd2	←	Sustainable development	0.839	0.092	11.019	0.090	0.703
sd3	←	Sustainable development	0.853	0.095	10.492	0.092	0.727
s21 Logistics operation	←	Cloud platform	0.837	0.158	9.722	0.075	0.701
s22 Sustainable development	←	Cloud platform	0.254	0.200	2.786	0.05	0.792
s22 Sustainable development	←	Logistics operation	0.666	0.143	5.594		

5.3. Cloud Logistics Operation

The cloud logistics operation dimensions included "speed", "collaborative efficiency", "information transparency", "green logistics", "accuracy", and "technical capability", which were the main factors affecting the selection of logistics operation. In addition, as shown in Table 8, "information transparency" had the highest estimated load value of 0.825, and its R2 value was 0.680, much higher than 0.4, indicating that it was very explanatory. The estimated load values of the other questions were between 0.714 and 0.825, and the T-value was also greater than 1.96, reaching a significant level. The R2 values ranged from 0.510 to 0.680, and all the questions came to the standard of 0.4, indicating high explanatory ability. According to the above analysis, "speed", "collaborative efficiency", "information transparency", "green logistics", "accuracy", and "technical capability" were the main factors affecting logistics operation. Of these, "information transparency" had the strongest correlation with logistics operation, which was consistent with the data feedback of our research. The reason was because an end-to-end cross-profession integrated supply chain collaboration and control platform possesses the transparency of end-to-end supply chain information.

Nevertheless, visibility to tier-one suppliers is insufficient for large manufacturers because tier-two or -three sub-suppliers are often more vulnerable to events such as epidemics. The transparency analysis of this information included order quantity analysis, order item number analysis, item quantity analysis, order time analysis, etc. These analyzed data could be repeatedly used and referenced in operation system planning. They make planning content more in line with the actual needs of enterprises and provide reliable and trusted information sources for all partners, automating and complementing end-to-end supply chain transactions between trading partners with high accuracy. Furthermore, they collect reports and predictions about supplier performance and coordinate them to adapt to changing needs, which is crucial for supply chain digitization.

5.4. Test of Path Coefficient Hypothesis

Assuming Hypothesis 1, the operation of a cloud platform can help organizations better conduct their brand image, user, function, and risk assessment operations. In Table 9, the parameter estimation table of the overall model, the path coefficient of the cloud platform to logistics operation was 0.837. The T-value was 9.722, which was higher than the standard of 1.96, indicating that the estimated value of the path coefficient was significant. Therefore, Hypothesis 1 of this study was accurate, indicating that the higher the consumer's recognition of the cloud platform of the company, the higher the consumers' dependence on logistics operations. From the sample survey, we still found some gaps in the research on supply chain management in the past few years regarding how to incorporate the social dimension. In particular, the business environment has become customer-oriented, and outstanding brand equity and value equity are no longer enough to retain customers. Therefore, strengthening of the intimacy of the relationship between customers and the organization is necessary [84].

Table 9. Path relationship verification table.

Hypothesis	Path	Hypothesis Relationship	Path Value	Whether the Hypothesis Idea Was True
H1	Cloud platform → logistic operation	Positive	0.837 *	True
H2	Cloud platform → sustainable operation	Positive	0.254 *	True
H3	Logistic operation → sustainable operation	Positive	0.666 *	True

Note: "*" means significant at the significance level of 0.05.

Assumption 2 stated that enterprise organizations can construct and improve their cloud logistics platform index design and operation through the sustainable development of society, the economy, and the environment. According to the parameter estimation table of the overall model (Table 9), the path coefficient of sustainable development with the cloud platform was 0.254. The T-value was 2.786, higher than the standard 1.96, indicating that the estimated path coefficients were significant. Therefore, Hypothesis 2 of this study held that the higher the consumer's recognition of the case company's cloud platform, the higher the consumer's credit for the case organization's sustainable development.

Assuming 3, the speed, synergy efficiency, punctuality rate, green logistics, information transparency, technical capabilities, and other aspects of cloud platforms could help enterprises achieve better sustainable development effects. According to Table 9, the parameter estimation table of the overall model, the path coefficient of cloud logistics operation to sustainable development was 0.666. The T-value was 5.594, higher than the standard of 1.96, indicating that the estimated value of the path coefficient was significant. Therefore, Hypothesis 3 of this study was valid, meaning that the higher consumers' recognition of the cloud logistics operation of the case company, the higher the degree of the practice of sustainable development of the organization.

In conclusion, the path value of cloud platform → logistics operation in Hypothesis 1 in this paper was 0.837. Assuming that the relationship was positive, the T-value was 9.722 > 1.96, which was significant, and the hypothesis relationship was genuine. In Hypothesis 2, the path value of cloud platform → sustainable operation was 0.254. Assuming that the relationship was positive, the T-value was 2.876 > 1.96, which was significant, and the hypothesis relationship was genuine. In Hypothesis 3, the path value of logistics operation → sustainable management was 0.666. Assuming that the relationship was positive, the T-value was 5.594 > 1.96, which was significant, and the hypothesis relationship was genuine. The theoretical model of the SEM analysis of the overall results is shown in Figure 2.

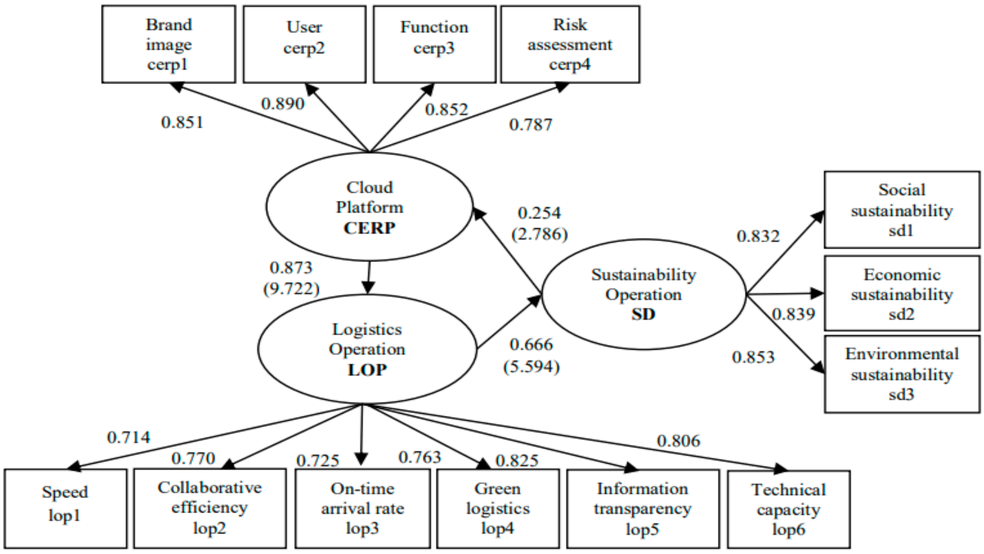

Figure 2. Theoretical Model with SEM Analysis.

6. Conclusions

6.1. Research Findings

What important content about the contemporary cloud platform should be mastered for the first research question and goal of this paper? What kind of help can it bring to the operation of the enterprise? Enterprise operation always needs to put customer service satisfaction first, and many factors affect customer service satisfaction. Through this research, we know that, from the perspective of logistics services, the more critical parts include corporate image, information transparency, efficiency, green logistics channels, etc., primarily through correlation analysis; these parts affect the overall service quality of enterprises to varying degrees. The most important thing for enterprises is to consider and incorporate these parts into the design aspect of a cloud platform to improve customer service satisfaction. In response to this paper's second research question and goal, how can cloud platforms help enterprises achieve sustainable development? This paper believes that the three aspects of economic profit, social harmony, and environmental protection must be based on the user experience and corporate image that a cloud platform attaches importance to as the main framework [25,33]. Then, the contents of enterprise operations in different aspects must be established. For example, economic profit is designed around efficiency indicators, social harmony is designed around information transmission indicators, and environmental protection is designed around green channel indicators. Then, the correlation between the three is calculated, especially the impact of these purchases on cloud platform operations. How do we measure the substantive benefits of assisting enterprises in implementing sustainable development through cloud platforms for this paper's third research question and objective? Which metrics should be noted? In this regard, first of all, we used a structured questionnaire survey, collected relevant data through online data, and utilized SPSS and AMOS tool research and analysis methods to analyze the critical impact of logistics operators on the sustainable development of enterprises through cloud operating systems from the perspective of users. The constructs and observations of the null hypothesis model were removed and merged through the validation analysis (CFA) of the constructs and statements in the model and the path analysis (PA) of the causal relationship between the constructs. After revising the model, we evaluated the model, verified the rationality of the data with multiple fitting indicators, adjusted the model, and established a research framework [34,85].

Secondly, this research topic, combined with the process of this case study, integrated the data analysis results of this paper. The research contribution was first reflected in the index construction of the model calculation. In particular, it was recommended that relevant enterprises building cloud platforms in the future could pass the measures of "corporate image" (0.851), "user" (0.890), "function" (0.852), and "risk assessment" (0.787). These four observations could serve as a focus for strengthening cloud platforms. The "speed" (0.714), "cooperative efficiency" (0.770), "on-time arrival rate" (0.725), "green logistics" (0.763), "information transparency" (0.825), and "technical capability" (0.806) logistics operation could be regarded as the focus of strengthening logistics operations. They could also be used as a reference index to test the operation efficiency of a cloud logistics system, which is conducive to establishing innovative service models for enterprises. Compared with these data, they also reflected the operation services of a cloud logistics platform. Communication between enterprises and external partners makes it easier to establish and maintain a strong cooperative relationship [86,87], which is also an important manifestation of the value of the empirical application. In addition, the study also found that the risk assessment value was relatively low, indicating that enterprises generally have weak awareness of the risk assessment of cloud systems, which is also consistent with previous research [42,44]. When risks are not adequately controlled, uncertainties can affect an organization's operations or cause supply chain disruption risk factors [39,43,45]. The results of the hypothesis testing showed that cloud platform services facilitated real-time data visibility and risk analysis to understand the impact these threat events may have on an enterprise's critical business and essential stakeholder resources. Finally, according to the business impact analysis and risk analysis results, a company BCM strategy was formulated to achieve complementarity between views.

Based on the above research results, in general, through practical operation and hypothesis testing, the academic research contribution of this paper was reflected in the impact of cloud operations on the sustainable development of enterprises. In this regard, this study found that the estimated load value of the sustainable development of enterprises from the environmental dimension was the highest (0.853), and the R2 value (0.727) was much higher than the standard value of 0.4, indicating that it was very explanatory. The results showed that cloud platform was highly correlated with sustainable enterprise development (0.254), and cloud platform was positively correlated with logistics operation (0.837); in addition, cloud platform and logistics operation were highly associated with sustainable organizational development (0.666). Therefore, through the combination of theory and practice, this paper believes that the above three observation indicators could be used as an optional optimization model for logistics operators to strengthen sustainable organizational development. It is also an important reference point for enterprises to improve cloud platform operations and applications in the future. As for the contribution of this paper to the actual process of the enterprise, for the international logistics industry and related enterprises, this research proves that a logistics operation business service model based on a cloud platform could meet the needs of customers to a greater extent, including the convenience of operation, as well as the information flow and accurate, real-time feedback between two parties. In particular, the empirical analysis results showed that the competitive advantage of today's logistics operators no longer depends on the level of operation management analysis but must be combined with the vast convenience and application value of cloud technology to enhance the competitiveness of logistics operators. The market competitiveness of an enterprise depends on realizing its sustainable development vision in terms of economic benefits, social harmony, and environmental protection. This is also in line with the ESG and SDG evaluation requirements adopted by the government for large enterprises; therefore, international logistics operators should strengthen the maintenance of the natural environment on the premise of not disturbing the market order and free competition, as well as on the premise of maximizing economic benefits and protection. Still, the urgency of environmental protection is a fundamental principle of corporate governance [34,38].

6.2. Theoretical Implications

This study has two significant theoretical research contributions. First, this study used the cloud supply chain platform to conduct structural equation modeling and a regression analysis through each link supplier's raw material procurement, logistics, production, and questionnaire data for each link. It confirmed that logistics operations had an intermediary effect on cloud platforms and sustainable development structures, and the performance of supply chain members was in line with the social exchange theory of data sharing [86,87]. Moreover, it reduced the uncertainty of partner supply chain activities and the risk of introducing new services to the market [61,88] and proved that cloud platform logistics operations support collaboration and decision making. The association supply chain members further reduce the risk of carbon emissions harming the environment. Instead, they provide a competitive advantage of considerable flexibility in the face of rapid market changes [61,64,89–91].

Another study revealed that strategic resources occupy a crucial position in enterprises. Compared with the original reliance on the global supply chain through cloud platforms, localized procurement and production, if used, can help reduce complexity. Diversified sourcing also often adds complexity. From the perspective of the network, by increasing resource-sharing behavior among supply chain cooperation members through a cloud platform, enterprises can use a cooperative method to establish contact with critical organizations in order to obtain and transfer the required strategic resources. Doing so can help with the development of industrial networks among organizations. It is also a source of sustainable competitive advantage for enterprises [92–94].

That is to say, from the perspective of the composition of cloud platform logistics operation business model services, enterprises can establish and maintain solid cooperative relations with external partners, make supply chain information transactions transparent, quickly obtain novel ideas and needs, and make enterprises more competitive [95]. Cloud platforms can grasp both timeliness and predictability, provide opportunities to learn more [96], and provide for business activities critical academic contributions to environmental and social integration applications in the field [94,97]. It thus increases enterprise value and reduces operational risk, not only for the sustainable operation of enterprises, but also growing opportunities for heterogeneity [97] and promoting a competitive advantage for innovative long-term performance. All of these factors drive cloud platform operations to achieve economies of scale while providing potential revenue-generating effects to achieve the goal of sustainable enterprise development.

6.3. Research Limits and Future Research Directions

This research adopted a structured questionnaire survey through online data collection. Due to the severe global epidemic of COVID-19, the industrial supply chain has been disconnected, resulting in an excessive workload for the employees of the interviewed companies, which indirectly affected the quality and quantity of the questionnaire. Those who answered the questions of each variable according to the facts may have led to errors in the selection of the research. Through a combination of the relevant literature and practices in the past, although the empirical results found that, for the cloud platform, the sustainable development, and the logistics operations of organizations, there was a significant correlation between these indicators, there was still a lot of residual explanation space, indicating that other factors may also affect these variables. Hence, it is also worthy of further study in future research.

Businesses are faced with the challenges brought by the global supply chain of establishing a real-time inventory in an intelligent supply chain and implementing a strategy of all channels, as well as an online-to-offline store (O2O) business model [98]. As triple-technology applications are more rapidly integrated into various cross-domain scenarios, smart retail should be the development trend of the future retail industry. Its digital transformation process in supply chain management and other aspects integrates commodity management, logistics management, payment mechanism, aftersales service, and inventory management, and it seamlessly integrates and optimizes sales channels. However, this study may have specific limitations in utilizing cloud operating systems to achieve sustainable development in the logistics industry. It does not further understand consumers' purchasing intentions for bright retailing to achieve a sustainable online-to-offline (O2O) strategy [98]. This research did not focus on an in-depth analysis of the readjustment of a cloud logistics platform's systemic plan strategy and service mechanism to control the delivery time and variable demand of the O2O retail process.

In addition, this study only considered the backend customers' perception of the cloud logistics platform as the research object. It is recommended that follow-up researchers take frontend and industry from commodity procurement, logistics management, information processing, and management technology as part of their research and discussion, as well as our sample survey found in the past few years of supply chain management research and how to integrate it. There are still some gaps in the social dimension. Therefore, with the introduction of cloud information and communication technology, during the evolution of the social-embedded relationship and structure between manufacturers [97,99], their inter-organizational business behavior changes at different stages and affects the relationship between customers and organizations [100]. It is indeed an essential element of business model sustainability. Therefore, follow-up researchers can incorporate these as research directions into more research variables, expand the research object industries from a macro-perspective, and compare whether the decision-making factors considered by different industries are different when choosing a cloud platform under a given strategy and whether the importance differs. This research can be used as an optimization model for logistics operators to create more complete, differentiated, and sustainable business model research [101,102].

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Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest in this study.

Appendix A

Questionnaire

Dear Sir/Ms.

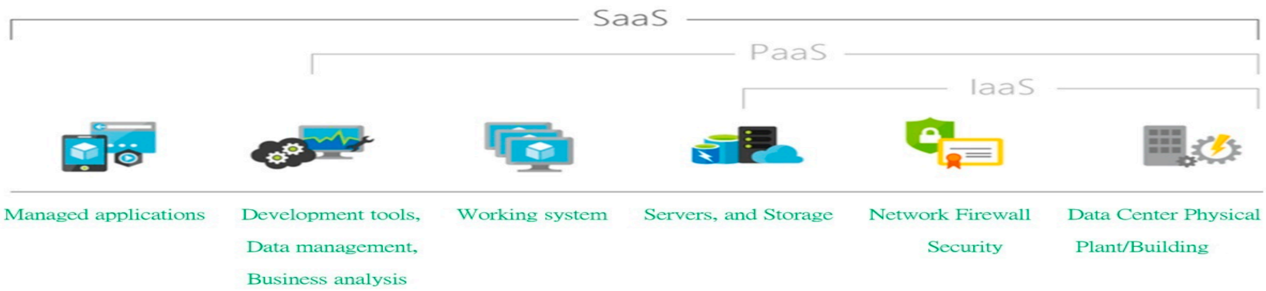
First, thank you for taking the time to complete this questionnaire. This questionnaire is an academic research questionnaire. The purpose is to understand and discuss the research of cloud systems on the sustainable development and strategic planning of the logistics industry. Your answers will be of great help to this research. Opinions and personal information will never be disclosed to the public; please feel free to answer.

Please complete this questionnaire based on your full-time employment. It consists of eight parts. The first part is "Corporate Image (cerp1)", the second part is "Users (cerp2)", the third part is "Function (cerp3)", the fourth part is "Risk Assessment (cerp4)", the fifth part is "Social Sustainability (sd1)", the sixth part is "Economic Sustainability (sd2)", the seventh part is "Environmental Sustainability (sd3)", and the eighth part is "Permanence of Logistics Operational Performance (LOP)". For the degree of applicability of each part of the question, please select the answer you think is appropriate in the (O) below the question item.

August 2020

Cloud Logistics Platform Service Quality Satisfaction Survey
Basic Feature Facets
Email address:
Gender:
Age:
Education:
Position :
Title:
Use cloud system qualifications:
Company industry type:
Company Size Amount of capital: ☐below 500,000 ☐510,000 to 2 million ☐2.01 million to 5 million ☐5 million to 10 million ☐10 million to 50 million ☐50 million to 100 million ☐More than 100 million **Number of workers:** ☐less than 10 people ☐10~20 people ☐21~50 people ☐51~100 people ☐101~300 people ☐more than 501 people
Your use of cloud services is: ☐Storage space or computing performance ☐Using the virtual host provided by the operator to set up the services you need ☐Using cloud services such as email, calendar, etc. through a web browser

Cloud computing services belong to the type:



- ☐ Infrastructure as a Service (IaaS) refers to consumers' processing, storage, network, and essential computing resources to deploy and execute multiple software such as operating systems or applications. The client can deploy and run processing, storage, network, and other fundamental computing resources without purchasing network equipment such as servers and software. It cannot control the underlying infrastructure, but it can control the operating system and storage device; deployed applications can sometimes also have limited control over specific network elements, such as host-side firewalls.
- ☐ Software as a Service (SaaS) is a service provider that provides software applications through web pages to install and manage software applications in the cloud; most are end users. For example, business applications include accounting systems, collaboration software, customer relationship management, management information systems, enterprise resource planning, invoicing systems, human resource management, service desk management, and the use of e-mail, calendar, and Office tools (such as Microsoft Office 365) and other cloud services.
- ☐ Platform as a Service (PaaS) is a cloud-computing service that provides a computing platform and solution services. In a typical layer of cloud computing, the PaaS layer is between Software as a Service and Infrastructure as a Service. PaaS allows users to deploy and build cloud infrastructure to force the client to use programming languages, libraries, and services. Users do not need to manage the control cloud infrastructure (including network, server, operating system, or storage) but must maintain the upper-layer application deployment and hosting environment.

The average transaction price range of cloud logistics platform transactions
☐less than 1000 ☐1000~10000 ☐10,000~50,000 ☐50,000~100,000 ☐more than 100,000

Cloud logistics platform transaction habits ☐use every time ☐use frequently ☐occasional use ☐only one time		
Number of transactions on cloud logistics platform ☐years ☐quarterly ☐uncertain ☐monthly ☐weekly		
Cloud logistics platform transaction reasons ☐work demands ☐living needs of relatives and friends ☐other		
Cloud Logistics Platform Trading Items ☐Electronic technology industry commodities (including materials) . . . ☐Traditional industry commodities (including materials) . . . ☐Agricultural commodities (including materials) . . . ☐Daily necessities . . . ☐Other . . .		
Dimensions	Description	Code
Brand image (cerp1)	The cloud logistics platform can meet the purpose of business development and the goal of realizing corporate image (including cloud system development).	Cp1
	The operation of the cloud logistics platform system can improve communication efficiency between enterprises.	Cp2
	The design of the operation interface of the cloud logistics platform system can specifically show the corporate image.	Cp3
	Using a cloud logistics platform is conducive to improving the overall evaluation of enterprises.	Cp4
	In addition to improving information transparency, cloud logistics platform data integrity as system forecasting also improves customer satisfaction.	Cp5
User (cerp2)	The interface is user-friendly of the cloud logistics platform.	user1
	The cloud logistics platform is jointly used by many enterprises so that more retailers can choose.	user2
	Cloud logistics platform user training situations and multiple cloud technology capabilities optimize operational processes to support new development of enterprises.	user3
	Cloud-based logistics platforms boost retailers' trust.	user4
	User response is fast to cloud logistics platform inquiries.	user5
	Cloud logistics platform IT resources are flexible to use and scale.	user6
Function (cerp3)	The cloud module is sophisticated (functionality, convenience, and flexibility).	f1

	The value-added accounting system of the cloud platform is easy to converge, summarize, and analyze and easy to read.	f2
	There is emphasis on building and deploying scalable, energy-efficient network applications that improve resource utilization.	f3
	Cloud logistics platform data has integrity and system testing.	f4
Risk assessment (cerp4)	The cloud logistics platform increases information transparency and builds trust.	risk1
	Punctuality and accuracy of information are provided by the cloud logistics platform.	risk2
	The cloud logistics platform assists supply chain management in creating advantages for enterprises.	risk3
	Cloud-based logistics platform involves public discussion on risk assessment procedures.	risk4
	Cloud logistics platform customers are active co-creators of company values and share risks.	risk5
	In terms of technology and regulations, for the cloud logistics platform, the protection of various risks is verified as a complete information security management system (GDPR/ISO 27001).	risk6
	When the cloud logistics platform has security problems, cloud service providers can compensate users for losses.	risk 7
	The cloud logistics platform is user-end, which can provide more security control rights and responsibilities at the system level.	risk8
Logistics Operation Performance (LOP)	The cloud logistics platform exposes the information flow between suppliers, which can improve the system's running speed and provide stable platform performance.	lop1
	The third-party logistics service provider of the cloud logistics platform should have professional information and organizational capabilities to improve logistics performance continuously.	lop2
	The cloud logistics platform can effectively grasp the order and inventory and achieve on-time delivery.	lop3
	The cloud logistics platform helps extend business ecology (upstream and downstream suppliers or enterprises).	lop4

	The cloud logistics platform optimizes the order delivery process, and third-party warehousing and logistics providers deliver goods directly to improve operational performance.	lop5
	The service provider, elasticity, and flexible scheduling capabilities of the cloud logistics platform are the key factors that determine the cloud operation capabilities of enterprises	lop6
Environmental Sustainability (sd3)	Cloud logistics platform management applications are used to integrate online transaction operations to help suppliers achieve sustainable green environmental protection.	envp1
	The third-party logistics service provider of the cloud logistics platform should have professional operation capabilities to make the procedures comply with environmental regulations.	envp2
	The cloud logistics platform is used to solve information asymmetry through resource sharing and assist in the continuous growth of green procurement and services.	envp3
	The big data of the cloud logistics platform can timely predict the market purchase volume, reduce inventory and transportation, and reduce the environmental impact.	envp4
	The cloud logistics platform improves various procedures, optimizes business management, and provides the best efficiency model for the green supply chain.	envp5
	The cloud logistics platform of cloud computing optimizes the efficiency of logistics vehicles and reduces environmental impact.	envp6
Economic Sustainability (sd2)	The cloud logistics platform meets the sharing needs and increases enterprises' return on investments in an optimized way.	ecop1
	The cloud logistics platform is utilized to improve the economic benefits of cooperation between related industries and suppliers.	ecop2
	The cost of exchange and sharing activities is justified for enterprises to build a cloud logistics platform to achieve resource activation, performance improvement, and stakeholder relations.	ecop3

	The cloud logistics platform is used to achieve timely delivery through application with suppliers (collaboration software, customer relationship management, and management information system).	ecop4
Social Sustainability (sd1)	The cloud logistics platform is used to share resources between enterprises and suppliers and promote a corporate philosophy of sustainable social development	sp1
	Cloud computing, AI intelligence, and cloud logistics platform value-added application service design help supply chain management to create advantages for social enterprises.	sp2
	The cloud logistics platform undertakes social obligations, increases financial resources, or seeks to bring ecological and environmental benefits.	sp3
	The cloud-based logistics platform undertakes social sustainability to promote a fair benchmark of business conduct.	sp4
General Characteristics (BFF)	There are trading habits of using cloud logistics platform.	off1
	The cloud logistics platform is used to improve service performance and transaction times.	off2
	Using the cloud logistics platform can reduce the occurrence of bad transactions (e.g., scheduling, tracking, exception management, and reconciliation).	off3
	The platform is a one-stop, customized solution for evaluating "environmental assessment, construction planning, relocation, maintenance, and management."	off4
	The cloud logistics platform is used to trade price ranges.	off5
	There is personal, overall evaluation of using the cloud logistics platform system.	off6
	Cloud transaction evaluation is executed for third-party logistics service providers of cloud logistics platforms.	off7
	Recommend to others the use the cloud logistics platform.	off8

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