

Retraction

Retracted: Mediating Effect of Organizational Learning Capacity on the Relationship between Relational Embeddedness and Innovation Performance in Freight Logistics Service

Complexity

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] P. Bai, Q. Wu, Q. Li, C. Xue, and L. Zhang, "Mediating Effect of Organizational Learning Capacity on the Relationship between Relational Embeddedness and Innovation Performance in Freight Logistics Service," *Complexity*, vol. 2021, Article ID 5516599, 18 pages, 2021.

Research Article

Mediating Effect of Organizational Learning Capacity on the Relationship between Relational Embeddedness and Innovation Performance in Freight Logistics Service

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Cooperative innovation has become a critical method for freight logistics firms in supply chain management. The previous study has proved that relational embeddedness (RE) has a positive effect on service innovation performance. However, the influence of organizational learning capacity (OLC) has been widely ignored. This study focuses on explaining the mechanism of OLC on the relationship between RE and innovation performance of freight logistics service (IPFLS). Firstly, a theoretical model is constructed based on Social Network Theory, and four research hypotheses are presented. Secondly, a sample of 236 respondents from freight logistics firms in China is analyzed to test the hypotheses. Finally, several management implications and recommendations are suggested. The research results demonstrate that both RE and OLC have positive effects on IPFLS. Meanwhile, OLC partially mediates the relationship between RE and IPFLS. The findings provide practical guidance for managers to strengthen the relationship with partners and enhance OLC.

1. Introduction

Under the demand-dominant logic, service becomes more and more important to customers [1]. In particular, customers have strict requirements on the delivery time of goods, on time or fast [2]. Therefore, traditional freight transportation has developed into freight logistics service (FLS). In addition to delivering goods to designated locations, FLS also considers transportation cost and time. It is a comprehensive logistics transportation mode, which provides shippers with more comprehensive and systematic processing, packaging, loading and unloading, storage, transportation, distribution, customs declaration, and inspection than freight or freight forwarding enterprises [3–5]. And FLS breaks the traditional management thinking, not just freight transportation. It needs to be emphasized that freight transportation in this paper is a link embedded in the modern logistics network.

Freight transportation industry is an indispensable part of the national economy and is developing rapidly. In 2019, China's commercial freight transportation volume reached 46.224 billion tons, an increase of 4.8 percent over the same period last year [6]. Furthermore, the freight transportation turnover was 19404.456 billion ton-km, up to 3.4 percent year on year [6]. In terms of the China transportation production index (CTPI), the freight transportation index showed a trend of growth throughout the year (show in Figure 1), with an average of 174.1. It indicates that the endogenous driving force in the freight transportation market accelerated to gather momentum, and the economic stabilization continued to improve.

Although freight transportation organization has been constantly optimized and transportation service quality has enhanced steadily, freight logistics firms (FLFs) are under much pressure against the requirements of customers [3].

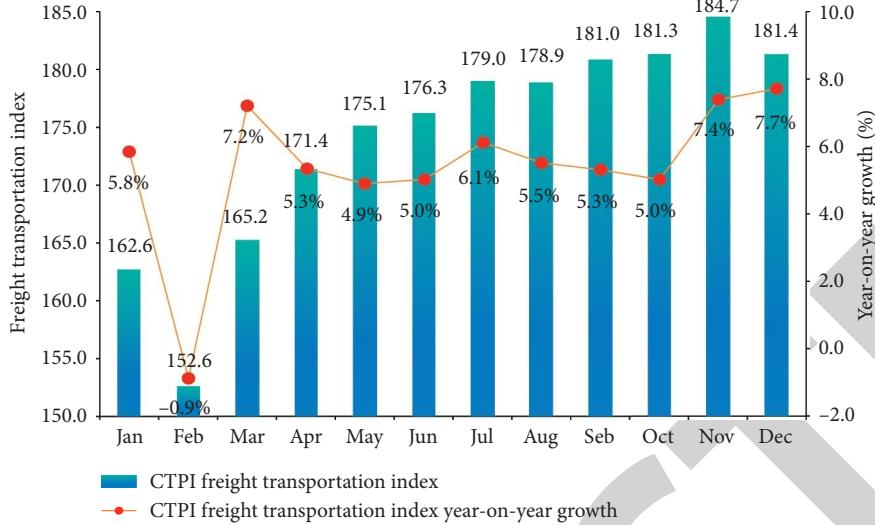


FIGURE 1: CTPI freight transportation index and its monthly growth changes in 2019 [7].

How to effectively manage the entire process of cargo displacement, improve customer satisfaction and service quality, and increase customer value is an important problem to be solved by FLS management.

With the intense competition and the differentiation of customer demand [8, 9], service innovation has become a significant method for FLFs to obtain competitive advantages and maintain sustainable development [4]. Cooperative innovation provides an effective mode for firms to learn technology and create knowledge and capacity. FLFs and external partners in the logistics network could gain independent objectives by cooperating. In general, cooperation stems from a firm lacking some key resources and capabilities [10, 11], which leads to the need for help from other firms. In the western freight transportation theory, the “interdependence” relationship between firms is emphasized [12]. In other words, it is far from enough for a firm to develop rapidly only by relying on its own resources and advantages [13]. FLFs must gain competitive advantages by cooperating with external partners, such as warehouse logistics service providers, information system service providers, and other firms in logistics parks.

On the one hand, due to the diversity and complexity of knowledge needed for cooperative innovation [14], FLFs could integrate their partners’ knowledge and resources across organizational boundaries to acquire the resources needed for service innovation by establishing good relationships with external partners such as the packing firm, the transport vehicle firm, and the manufacturing firm [10]. Therefore, the key to FLS innovation is to establish and maintain an interorganizational relationship. Relevant studies confirm that the degree of cooperation (i.e., relational embeddedness) between firms and external partners in the network has a positive effect on innovation performance [10]. Since each “relationship” or “connection” in the network of a firm represents the exchange of certain key resources and knowledge between two sides of the relationship [15, 16], how a firm uses the interaction of the

network to obtain the required resources and knowledge becomes an important source of innovation performance [17]. To achieve this, the firm needs to maintain appropriate relational embeddedness (RE) with external partners. Regarding appropriate RE, communication and coordination between firms could promote the transmission of knowledge and the opportunity to learn from each other, acquire knowledge, and improve performance [18]. Similarly, in the logistics network, the RE between freight companies and other partners will positively affect the innovation performance of freight logistics service (IPFLS).

On the other hand, organizational learning capacity (OLC) is also essential for cooperative innovation with external partners [19]. Scholars agree that firms across organizational boundaries to obtain resources and integrate capabilities of external partners [20] not only maintain moderate RE but also have a high level of learning capacity [19, 21, 22]. From the perspective of OLC, FLFs absorb and integrate knowledge and technology needed for service innovation. These capabilities are more effective in improving the IPFLS.

In network cooperative research, most scholars take knowledge sharing and trust as mediating variables. Qammach tests the mediating role of knowledge sharing in the relationship between IT ability and IT support to forecast the innovation performance in the mobile industry in Iraq [16]. Maciel and Chaves investigate informational status in intraorganizational networks via the mediating effect of knowledge sharing and structural holes. Akram et al. study the mediating effect of knowledge sharing on the mechanism of organizational justice affecting employee innovative work behavior [15]. For an enterprise, obtaining external resources through knowledge sharing is a passive process [23], depending on the status quo of the partners, while OLC is a process of actively acquiring external resources and knowledge, which is more important for enterprise innovation. However, few scholars have studied the mediating effect of OLC. Therefore, this paper explains the

relationships among RE, OLC, and IPFLS and the mediating effect of OLC in the logistics network. From the perspective of the resource-based view, the relationship between FLFs and external partners is the external resources that FLFs could utilize, while OLC is the inherent ability of FLFs to utilize external resources. This study will fill the gaps in related theoretical research and make a significant contribution to the integrity of FLS innovation theory to explore how FLFs can effectively integrate the external network resources and internal capabilities to enhance innovation performance, thereby increasing their competitive advantages.

The rest of the paper is organized as follows. In Section 2, the literature review is presented. In Section 3, we construct a theoretical model based on Social Network Theory and Organizational Learning Theory and put forward four research hypotheses. Section 4 is about the research method. The research adopted a questionnaire survey approach, including questionnaire design, data collection, reliability, and validity test. In Section 5, results analysis, hypothesis verification, and model interpretation are presented. The last section is the research conclusions and management implications.

2. Literature Review

2.1. IPFLS. Service innovation is different from the innovation of new products and the program innovation of new technology production process and defined as the introduction of technology-based services into the market. Santamaría et al. regarded innovation as the process of innovating new things and the actual product or result [24]. West et al. further stated that service innovation could bring multiple benefits to firms, and the degree of advantages and disadvantages of its service innovation could be examined from three dimensions: (1) quality: service results and service experience better than competitors and so on; (2) finance: reduce costs, achieve cost efficiency, obtain higher profits, and so on; (3) competitiveness: to bring the firm key competitive advantages, beyond the estimated market share and other goals, beyond the predetermined customer growth rate [25]. Extant research mostly studies service innovation in the manufacturing industry. Santamaría et al. looked at the difference between service innovation and product innovation in Spanish manufacturing [24]. West et al. explored technology-driven service innovation in the manufacturing industry [25]. Feng and Ma focused on the factors affecting service innovation in manufacturing firms [1]. However, service innovation in the service industry is quite different from that in the manufacturing industry in the following aspects: innovation mode [26], technological innovation [27], measure indicators [2, 28], and influence factor [9, 29].

FLFs link each part of a supply chain network and constitute a symbiotic system of mutual promotion with their partners. The research on FLS innovation is still at the preliminary stage. Many scholars mainly focus on innovation mode and innovation driving force of FLS. Yang et al. propose five modes of FLS innovation, including (1)

following the competitive innovation mode; (2) customer demand initiative innovation mode; (3) freight transportation technology innovation mode; (4) freight transportation network innovation mode; (5) innovative mode of value-added FLS [30]. Chu et al. build a “four-pyramid” model of FLS innovation based on the research results of Hofman et al., including new service concept, new customer service interface, new service delivery system, new technology application, strategic selection, and coordination [11]. By analyzing the driving force of FLS innovation, Ma et al. present FLS innovation mode, including the service professional mode, the organizational strategy mode, the network mode, and the technology innovation mode [3]. However, the research on its performance evaluation is almost blank. At present, the concept of FLS innovation alliance has not been unified. Scholars have explored it from different angles. Hirata. expound on the significance of the cooperative innovation mode between suppliers and manufacturers by studying the mode of technology innovation of Bao Steel Group as a supplier [31]. Hong et al. point out that the value of service innovation should be defined and adopted by customers rather than judged by production and exchange [32]. Lisowska and Stanislawski research the consociation of small and medium firms in an open innovation context [33]. Huang and Huang propose the interaction mechanism between FLS innovation and freight transportation customer demand based on a symbiotic relationship [34].

Above all, previous research on FLS innovation mainly focuses on the internal innovation of FLFs. The significant effect of the external acquisition of service innovation resources has been ignored. Several papers discuss how the relationship between firms and specific external partners influences the performance of service innovation, such as the role of customers in service innovation.

2.2. RE. RE results from the influence of the relationship between a member and other members in the network [35]. Granovetter proposes the concept of relational embedding. RE focuses on the interactive process in a network. Members share information and knowledge through the connection with other members [36]. Isaac et al. point out that relational embedding emphasizes the coupling effect of continuous cooperative activities among members [37]. Chen and Wang believe that relational embedding refers to an informal personal network formed jointly between firm and local suppliers, customers, and other partners, through which organizations can support, exchange information, and communicate with each other. RE in this paper is defined as the close intensity of cooperation between freight companies and other members in the logistics service network.

Many scholars have discussed the relationship between innovation performance and RE. For example, Gebreyesus and Mohnen prove that relationship embedding in the network means that firms could promote the transmission of knowledge and the opportunity of learning from each other through communication and coordination, so as to improve innovation performance [38]. Oehmichen and Puck point

out that maintaining a good relationship among MNE Subsidiaries would help improve innovation performance [39]. In terms of the relationship between RE and service innovation performance, relevant literature is scarce. Since RE was measured by joint strength, the difference of joint strength will lead to the dissemination of different information and knowledge and affect the performance of service innovation [40]. Chien et al. find that RE has a remarkable impact on the performance of service innovation in e-marketplaces [41].

In the context of FLS, with the changes in the competitive environment and differentiated needs of customers, small and medium-sized FLFs continue to carry out alliance innovation. Due to the lack of relevant theoretical research, it is difficult to support the management and sustainable development of FLFs. Therefore, the theory on the relationship between RE and IPFLS needs a thorough discussion.

2.3. OLC. In the previous research literature, organizational learning is a process of knowledge effect between an organization and its environment, the enhancement of an organization's capability to take effective action [22, 42], and the capability to maintain or improve performance within an organization based on experience [26, 42, 43]. OLC is the capacity owned by an organization to influence the stakeholders to provide long-term value for firms in terms of production and the spread of ideas [44]. Farsani et al. believe that OLC is the capability of a firm to generate new ideas and spread new ideas to the whole firm [45]. OLC in this paper is defined as the ability of freight enterprises to absorb and integrate the technical knowledge and information of other members in the logistics service network.

From the perspective of Knowledge-Based View, a firm acquires and integrates the resources and capabilities of external partners across organizational boundaries, in addition to maintaining a high degree of embeddedness with partners and building the appropriate relational embedding configuration, must have a high level of learning capacity [46]. In other words, the performance of innovation activities could be improved by absorbing and integrating the resources needed for innovation from the perspective of learning [26]. Network resources could be continuously converted into the practice of firms [42, 45]. To improve the learning capacity of service innovation, a firm may rely on good external relationships to obtain new product information, understand customers and market demands, integrate the information and knowledge distributed by network members, and form a complete knowledge base through close relationships [47].

As knowledge and competence become the tools to improve the competitiveness of enterprises, how to strategically establish relationships with partners and improve learning capacity has become an important issue [48–50]. The findings of many scholars verify that OLC has a positive influence on organizational innovation capacity. For example, Tohidi and Jabbari prove that organizational learning

is a critical factor for organizational innovation and introduced five factors of OLC on product innovation performance [51]. Turi et al. argue that cognitive learning factors have a significant impact on sustainable organizational development [52]. Ali et al. propose that, under the same organizational conditions, organizational learning could increase the capacity of an organization to innovate [53].

3. Theoretical Model and Hypotheses

FLS innovation in this paper refers to the cooperative innovation between FLFs and external partners in the network. Existing papers pay much attention to RE [12]. Drawing on Social Network Theory [54–57], this study explains and verifies the mediating mechanism of OLC on the relationship between RE and the IPFLS and explores how RE promotes the IPFLS by improving OLC (see Figure 2). Based on Social Network Theory and Organizational Learning Theory [19], this research analyzes the relationships among three variables (RE, OLC, and IPFLS) and presents four research hypotheses. The detailed analysis content is as follows.

3.1. The Relationship between RE and IPFLS. In a rapidly changing environment, the knowledge, technology, and resources needed by FLFs for service innovation are increasingly complex, and even large FLFs could not fully possess the various elements needed for innovation. It is becoming increasingly difficult for FLFs to develop new technologies, products, and services on their own. Particularly for small- and medium-sized freight logistics enterprises, recognizing their own limited resources, they have adopted cooperation with other enterprises to acquire knowledge and resources and cross-organizational learning to promote innovative performance [17, 32]. The resources needed for service innovation are challenging to be owned by a firm alone [17, 58] but exist in the network it is embedded in. At the same time, different external partners have different resources and capabilities [58], and their contributions to service innovation vary. Partners in the logistics network have complementary resources, which are conducive to improving the performance of FLS innovation activities [10].

According to Social Network Theory, heterogeneous resources that bring competitive advantage to firms not only come from inside the firms but also exist in the logistics network [10, 55, 56]. The connection between firms and external partners brings relationship rent and competitive advantages to firms [56]. The embedded features of firms in the logistics network not only affect the acquisition and use of resources but also affect their behavior and finally bring about the difference of performance and competitive advantages between firms [57]. According to Relational Embedding Theory, interorganizational relational embedding has the essence of trust [10]. When sharing complex information and tacit knowledge [15, 16, 23, 59], organizations will show the characteristics of high cooperation. They may solve problems together, encourage each other to innovate,

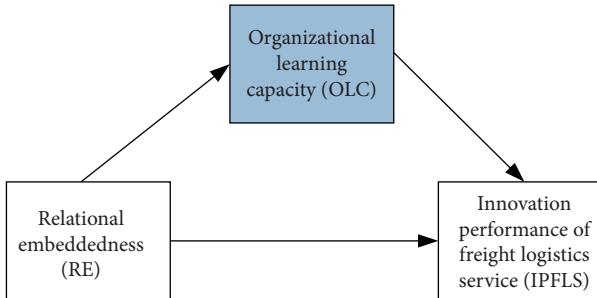


FIGURE 2: The theoretical model.

increase the chance of successful innovation, and improve innovation performance [15, 16].

According to the above analysis, a hypothesis is presented as follows.

Hypothesis 1. RE has a positive effect on IPFLS.

3.2. The Relationship between RE and OLC. As indicated earlier, the degree of relational embedding could be measured by the interaction and cooperation frequency, relationship duration, and collaboration intensity among network members [60]. Meanwhile, trust is at the heart of how network members interact. Previous research has demonstrated that RE has a positive influence on OLC. Ebers and Maurer argue that RE has a positive impact on OLC [61]. The longer the relationship between firms lasts, the higher the frequency of cooperation. The greater the intensity of cooperation is, the easier it is to form trust between each other [32]. Trust in the logistics network improves the accuracy of knowledge acquired from external partners and becomes an effective mechanism to ensure the quality and reliability of information and knowledge obtained from partners [62]. This trust-based relationship is beneficial to knowledge acquisition, absorption, and integration [10]. Moreover, knowledge is mostly embedded in the three basic elements of an organization, such as people, tools, and tasks, and belongs to a complex embedded network [13]. Complex embedded knowledge requires continuous interaction between firms. The frequency and intensity of interorganizational coordination and cooperation determine the flow of interorganizational complex embedded knowledge and its momentum, which promotes the absorption and integration of new knowledge in firms [16]. With the increasing RE and opportunities, the behavior norms and common language would be formed between firms and external partners and facilitate the transfer and learning of tacit knowledge [10].

According to the above analysis, a hypothesis is presented as follows.

Hypothesis 2. RE has a positive effect on OLC.

3.3. The Relationship between OLC and IPFLS. Organizational learning refers to the course of developing new knowledge and using it to improve organizational performance [19, 26]. OLC consists of absorption capacity

and integration capacity. The former is used to absorb external information and knowledge, including the capacity to acquire and digest knowledge [32]. The latter is adopted to integrate and apply internal and external knowledge [34].

In the context of FLFs, OLC plays a vital role in the process of searching and applying internal and external knowledge and information and integrating it into innovative service activities. Organizational learning could increase the innovative knowledge of an organization through continuous exploration and discovery [22, 44]. The abundant knowledge the organization has accumulated through learning would help it to take advantage of favorable opportunities, make profits for the firm, and promote its innovation performance [26].

According to the above analysis, a hypothesis is presented as follows.

Hypothesis 3. OLC has a positive effect on IPFLS.

3.4. Mediating Effect of OLC. Based on Organizational Learning Theory, OLC is very important for FLS innovation. Tohidi and Jabbari analyze that learning is the main factor for an organization to maintain innovation, so as to make it a profitable firm [51]. OLC depends on the external environment, and the core of the external environment is the microenvironment built between the firm and its partners [63]. According to its strategic objectives, the firm determines the number of partners and the RE. However, whether the knowledge, information, and other resources acquired through relational embedding could contribute to the improvement of innovation performance and the degree of performance improvement would depend on the ability to absorb and integrate knowledge and information.

Further, the mediating effect of OLC has been proved in other research fields, such as technology innovation and knowledge alliance. For example, Hirata et al. tests and modifies the conceptual model proposed and reveals the mechanism of the positive effect of RE on the performance of technological innovation by promoting exploratory learning (including knowledge acquisition and application) in firms [21]. Hong et al. prove the conceptual model proposed and illustrate the mechanism of green supply chain collaborative affecting innovation performance through absorptive capacity [32]. RE is precisely to establish a close and in-depth cooperative relationship with partners, which improves OLC and influences innovation performance through OLC.

In FLS context, FLS innovation depends not only on technology innovation but also on service innovation. Service innovation needs much essential knowledge, information, and culture embedded in external partnerships, such as Internet company and vehicle company. To obtain these resources, knowledge, and culture needed for innovation, FLFs need to establish good relationships with various important partners. In addition, organizational learning is not only the learning of knowledge but also the absorption of culture, adaptation of environment, and other soft aspects. According to the above reasoning and deduction, OLC may have a mediating effect on the

relationship between RE and IPFLS. Therefore, the following hypothesis is provided.

Hypothesis 4. OLC mediates the relationship between RE and IPFLS.

4. Research Design

4.1. Sample and Data Collection. Data were collected by telephone inquiry and questionnaire. During the data collection process, the researchers contacted each firm by making a phone call to the manager who is very familiar with its situation, confirming to him/her the importance of the research and the rationality of the research framework, and making a preliminary discussion on the questionnaire items in this study. Affected by the epidemic (COVID-19), the questionnaire survey was completed with the assistance of an online questionnaire website (questionnaire star), which issued questionnaires and collected data. Then the research team conducted data entry and data analysis.

In order to ensure the quality of the questionnaire survey, the respondents were required to be familiar with the cooperative matters of the enterprise. The degree of respondents' familiarity with the external cooperation affairs of enterprises is a crucial control factor and divided into five levels: very unfamiliar, unfamiliar, common, familiar, and very familiar, and only the familiar and very familiar interviewees were invited to complete the questionnaire.

In this survey, a total of 384 questionnaires were issued, 291 of which were completed and returned. 55 invalid questionnaires were eliminated. A total of 236 valid questionnaires were used for further analysis, with an effective recovery rate of 61.46%. Table 1 presents the structure characteristics of the sample.

4.2. Measurements of Research Variables. The questionnaire includes questions on RE, OLC, and IPFLS, as well as enterprise-scale and cooperation experience, based upon the previous study. As most of these variables are difficult to be measured objectively and quantitatively, this study adopts the Likert seven-grade scale scoring method to measure them. A numerical scale of 1 to 7 indicates disagreement to agreement or a transformation from low to high. 4 represents the intermediate state. The detailed questionnaire is provided in Tables 2–5.

RE is the degree of trust, reciprocity, and intimacy between FLFs and external partners in the network. Granovetter suggests that strong association has four characteristics, including the length of time, the intensity of emotion, intimacy, and reciprocal service [60]. Nelson defines strong association as friendship, reciprocity, and frequent contact [64]. Rindfleisch and Moorman discuss the theory of joint and several into the study of relationship exchange and proposed four items of joint strength: (1) we are grateful for what our partners have done for us in the past; (2) our related personnel maintain close social relations with our partners; (3) we are satisfied with the relationship with our partners; (4) we will continue to cooperate with our

partners [65]. Therefore, regarding the measurement variables proposed by Granovetter, Nelson, Rindfleisch, and Moorman, 7 items of measuring RE in this study are constructed (Table 6).

OLC is the ability to form the firm's advantages by learning from its external environment, absorbing and internalizing knowledge, and making use of market opportunities to make profits for enterprises [45]. Grant proposes that OLC is an organization's ability to identify, acquire external information, digest, absorb, and exploit it for organizational operation [66]. Tohidi and Jabbari analyze that OLC is based on existing knowledge and experience, identifying, digesting, and absorbing external technical knowledge and developing new products of symbolic market trends and could be refined into knowledge acquisition ability, recognition ability, and understanding and digestion ability [50]. Gomes and Wojahn present that OLC could integrate knowledge embedded in an organization's internal and external networks and apply it to the actual development of new products and could be refined into the integration of external knowledge, reorganization of internal knowledge, and the degree of applied knowledge [63]. Based on the measurement variables proposed by Grant, Tohidi and Jabbari, and Gomes and Wojahn, 8 items of measuring OLC are constructed in this study (Table 6).

For measurement items of the IPFLS, we mainly refer to performance indicators of new service development. Storey and Kelly propose several performance indicators of new service development [67]. Gomes and Wojahn suggest 5 items of innovation performance: "Good for corporate image," "Improved the competitiveness of the company," "Improved the company's future development potential," "Contributes to goals and long-term strategies," and "Facilitate the development of other innovative services" [63]. Based on the measurement variables proposed by Storey and Kelly and Gomes and Wojahn, we construct 10 items of measuring IPFLS in this study (Table 6).

4.3. Test Method. In this study, structural equation model is used to test the mediating effect of OLC on the relationship between RE and IPFLS. The specific procedure and criteria are as follows.

Step 1: OLC regresses to RE, and the regression coefficient should be significant.

Step 2: IPFLS regresses to RE, and the regression coefficient should be significant.

Step 3: IPFLS regresses to OLC, and the regression coefficient should be significant.

Step 4: RE and OLC enter the regression equation at the same time. In the case that the regression coefficients are significant between RE and OLC and between OLC and IPFLS, if the regression coefficient of RE and IPFLS becomes insignificant, it indicates that there is a complete mediating effect (as shown in Figure 3(b)). If the regression coefficient of RE and IPFLS is still

TABLE 1: Structure characteristics of the sample.

Variable	Item	Sample size	Percentage (%)	Cumulative percentage (%)
Employees number	<100	30	12.71	12.71
	100~200	24	10.17	22.88
	>200	182	77.12	100
Asset size	<30 million RMB	23	9.75	9.75
	30~100 million RMB	19	8.05	17.8
	100~300 million RMB	31	13.14	30.94
Cooperation experience	>300 million RMB	175	74.15	100
	Common	25	10.59	10.59
	Rich	87	36.86	47.45
	Very rich	124	52.54	100

TABLE 2: Q1. Basic information of freight transportation firms.

Code	Variable	Item	Choose “√”
1	Employees number	<100	
		100~200	
		>200	
2	Asset size	<30 million RMB	
		30~100 million RMB	
		100~300 million RMB	
3	Cooperation experience	>300 million RMB	
		Very not rich	
		Not rich	
4	Previous year's turnover	Common	
		Rich	
		Very rich	
5	Respondents' familiarity	<10 million RMB	
		10~30 million RMB	
		30~150 million RMB	
		150~300 million RMB	
		>300 million RMB	
		Very unfamiliar	
		Unfamiliar	
		Common	
		Familiar	
		Very familiar	

TABLE 3: Q2. To what extent do you agree/disagree with the following relationship between your firm and partners?

The relationship between your firm and partners	7 = strongly agree 6 = agree 5 = somewhat agree 4 = maybe/not sure 3 = somewhat disagree 2 = disagree 1 = strongly disagree
A1. Will maintain a long-term relationship	7 6 5 4 3 2 1
A2. Interact closely	
A3. Highly cooperation	
A4. Be grateful to your partners	
A5. Good interpersonal relationship	
A6. Satisfactory relationship	
A7. Continue cooperation	

TABLE 4: Q3. To what extent do you agree/disagree with the following capacity to absorb and integrate knowledge related to freight transportation service products?

Organizational learning capacity	7 = strongly agree							
	6 = agree							
	5 = somewhat agree							
	4 = maybe/not sure							
	3 = somewhat disagree							
	2 = disagree							
	1 = strongly disagree							
	7	6	5	4	3	2	1	
B1. Obtain freight transportation service development information								
B2. Acquire freight transportation service development technology								
B3. Understand and absorb new knowledge								
B4. Identify freight transportation service development opportunities								
B5. Combine new external knowledge								
B6. Regroup internal knowledge								
B7. Use knowledge to respond to environment changes								
B8. Apply the new knowledge to the operation process								

TABLE 5: Q4. To what extent do you agree/disagree with the following innovative performance of freight transportation services?

Freight transportation service innovation performance	7 = strongly agree							
	6 = agree							
	5 = somewhat agree							
	4 = maybe/not sure							
	3 = somewhat disagree							
	2 = disagree							
	1 = strongly disagree							
	7	6	5	4	3	2	1	
C1. Achieve high probability								
C2. Freight traffic has increased significantly								
C3. Significant cost reduction								
C4. High return on investment								
C5. Increased market share								
C6. Good for corporate image								
C7. Improved the competitiveness of the company								
C8. Improved the company's future development potential								
C9. Contribute to goals and long-term strategies								
C10. Facilitate the development of other innovative services								

TABLE 6: Measurements of variables.

Measurements		References
Relational embeddedness (RE)		
A1	Will maintain a long-term relationship	
A2	Interact closely	
A3	Highly cooperation	
A4	Be grateful to your partners	
A5	Good interpersonal relationship	Granovetter, Nelson, and Rindflesch and Moorman
A6	Satisfactory relationship	
A7	Continue cooperation	
Organizational learning capacity (OLC)		
B1	Obtain transport service development information	
B2	Acquire transport service development technology	
B3	Understand and absorb new knowledge	
B4	Identify transport service development opportunities	
B5	Combine new external knowledge	Grant, Tohidi and Jabbari and Gomes and Wojahn
B6	Regroup internal knowledge	
B7	Use knowledge to respond to environment changes	
B8	Apply the new knowledge to the operation process	

TABLE 6: Continued.

Measurements	References
Innovation performance of freight transportation service (IPFLS)	
C1 Achieve high profitability	
C2 Passenger/freight traffic has increased significantly	
C3 Significant cost reduction	
C4 High return on investment	
C5 Increased market share	
C6 Good for corporate image	
C7 Improved the competitiveness of the company	
C8 Improved the company's future development potential	
C9 Contributes to goals and long-term strategies	
C10 Facilitate the development of other innovative services	Storey and Kelly and Gomes and Wojahn

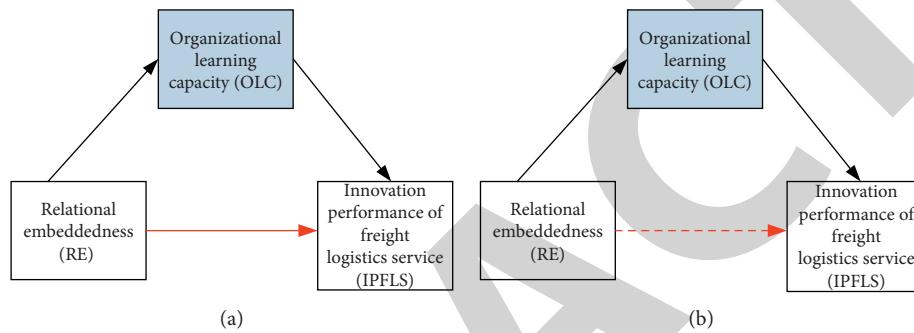


FIGURE 3: Mediating effect types of OLC. (a) Partial mediating effect. (b) Complete mediating effect.

significant but lower than that in Step 2, the existence of partial mediation is indicated (as shown in Figure 3(a)).

5. Data Analysis and Results

5.1. Reliability and Validity. After the research team received the completed questionnaires, reliability analysis and validity analysis are generally two initial analyses that must be conducted to verify. The software SPSS 25.0 is used to analyze reliability and validity. For reliability, it is crucial to produce stable and consistent results. The higher the test reliability is, the more reliable the result is. There are many ways to measure the reliability. Cronbach's coefficient alpha is widely used in almost all questionnaire reliability analyses. Generally speaking, the Alpha coefficient should be above 0.8, and 0.7~0.8 is an acceptable range. Nevertheless, the Alpha coefficient of subscale should be above 0.7, and 0.6~0.7 is acceptable. If the reliability coefficient is lower than 0.6, the scale should be modified. In this study, Cronbach's coefficients of RE, OLC, and IPFLS are 0.767, 0.752, and 0.755, respectively, which are all greater than 0.7 and are within the acceptable range (see Tables 7~9). Therefore, it indicates that the reliability of the questionnaire is qualified.

Validity is the degree to which the measured results reflect the content to be examined. The validity of the questionnaire could be checked by the constructs of criterion validity and coherency. Bartlett Test of Sphericity and KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) are used to analyze the structure validity in this paper. Results of KMO of RE, OLC, and IPFLS are 0.823, 0.840, and 0.817, respectively (see Table 10), which are all greater than 0.8, and

the Bartlett statistic is different from 0. Therefore, the validity of the questionnaire is excellent.

5.2. SEM Test. The above analysis indicates that the reliability and validity of the questionnaire are qualified. Thus, the researchers conducted further analysis.

5.2.1. Test of the Effect Model of RE on OLC. In this paper, software AMOS22 is used to verify the effect model of RE on OLC in Figure 2, and the fitting indexes are obtained. As shown in Table 11, χ^2/df is 1.535, less than 2, RMSEA is 0.048, less than 0.05, RMR is 0.043, less than 0.05, and other fitting degree indexes are greater than 0.9. The results illustrate that the effect model of RE on OLC has relatively high reliability.

According to the operating results of the model, the standardized regression coefficient of RE to OLC is 0.491, and it is significant at the 0.001 level (see Table 12 and Figure 4). Hypothesis 2 is verified. One of the conditions for the determination of the mediating effect is that OLC is regressive to RE, and the condition of the significance of the regression coefficient is satisfied.

5.2.2. Test of the Effect Model of RE on IPFLS. Similarly, this paper verifies the effect model of RE on the IPFLS in Figure 2, and the fitting indexes are shown in Table 13. We can see that χ^2/df is 1.578, less than 2, RMSEA is 0.050, less than 0.08, which is good, RMR is 0.034, less than 0.05, and other indexes are basically greater than 0.9, except that TLI is

TABLE 7: Cronbach's coefficient alpha test of RE ($N=236$).

Cronbach's coefficient alpha		Item-population Correlation coefficient	Alpha with deleted item	Alpha
Variable	Item			
RE	A1	0.428	0.750	
	A2	0.525	0.730	
	A3	0.503	0.735	
	A4	0.498	0.736	
	A5	0.451	0.746	
	A6	0.473	0.741	
	A7	0.530	0.730	0.767

TABLE 8: Cronbach's coefficient alpha test of OLC ($N=236$).

Cronbach's coefficient alpha		Item-population Correlation coefficient	Alpha with deleted item	Alpha
Variable	Item			
OLC	B1	0.471	0.722	
	B2	0.466	0.723	
	B3	0.343	0.744	
	B4	0.377	0.739	
	B5	0.428	0.73	
	B6	0.549	0.707	
	B7	0.515	0.714	
	B8	0.434	0.729	0.752

TABLE 9: Cronbach's coefficient alpha test of IPFLS ($N=236$).

Cronbach's coefficient alpha		Item-population Correlation coefficient	Alpha with deleted item	Alpha
Variable	Item			
IPFLS	C1	0.438	0.732	
	C2	0.495	0.723	
	C3	0.396	0.738	
	C4	0.444	0.731	
	C5	0.368	0.742	
	C6	0.436	0.732	
	C7	0.464	0.729	
	C8	0.393	0.738	
	C9	0.326	0.748	
	C10	0.406	0.737	0.755

TABLE 10: Results of KMO and Bartlett Test of Sphericity.

KMO and Bartlett Test of Sphericity		Bartlett Test of Sphericity			Test results
Variable	KMO	χ^2	Df	Sig.	
RE	0.823	317.748	21	0.000	Pass
OLC	0.840	305.330	28	0.000	Pass
IPFLS	0.817	314.140	45	0.000	Pass

0.886, which does not affect the overall effect. The results illustrate that the effect model of RE on the IPFLS has high reliability.

The standardized regression coefficient of RE to the IPFLS is 0.49, and it is significant at the 0.001 level (see Table 14 and Figure 5). Hypothesis 1 is verified. The second criterion of the

mediating effect is that IPFLS regresses to RE, and the condition of the significance of the regression coefficient is satisfied.

5.2.3. Test of the Effect Model of OLC on IPFLS. Similarly, this paper verifies the effect model of OLC on the IPFLS in Figure 2, and the fitting indexes are shown in Table 15.

TABLE 11: Fitting results of RE influencing OLC.

	χ^2	df	χ^2/df	Fitting index				
				RMSEA	RMR	GFI	IFI	CFI
Basic model	136.650	89	1.535	0.048	0.043	0.931	0.929	0.927
								0.914

TABLE 12: Estimate of RE influencing on OLC.

	Path	Estimate	SE	CR	P	Label
OLC	<---	RE	0.491	0.094	4.613	***
A7	<---	RE	0.623			
A6	<---	RE	0.549	0.14	6.582	***
A5	<---	RE	0.531	0.126	6.411	***
A4	<---	RE	0.556	0.141	6.65	***
A3	<---	RE	0.572	0.142	6.785	***
A2	<---	RE	0.615	0.153	7.149	***
A1	<---	RE	0.517	0.135	6.284	***
B1	<---	OLC	0.537			
B2	<---	OLC	0.541	0.194	5.914	***
B3	<---	OLC	0.395	0.155	4.723	***
B4	<---	OLC	0.433	0.168	5.069	***
B5	<---	OLC	0.515	0.175	5.729	***
B6	<---	OLC	0.631	0.188	6.481	***
B7	<---	OLC	0.606	0.18	6.339	***
B8	<---	OLC	0.547	0.186	5.957	***

*** Significance level $p < 0.001$.

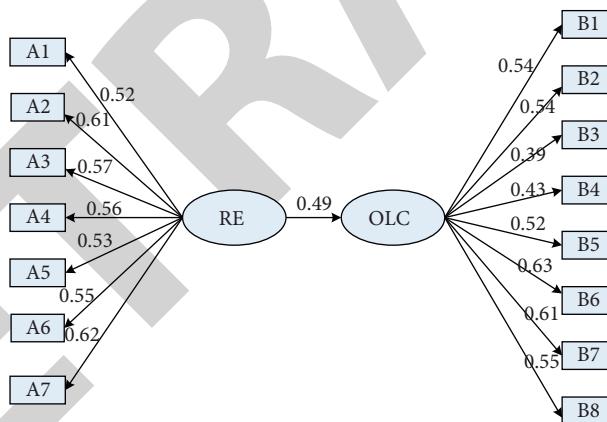


FIGURE 4: Model of RE influencing OLC.

TABLE 13: Fitting results of RE influencing on IPFLS.

	Fitting index					GFI	IFI	CFI	TLI
	χ^2	df	χ^2/df	RMSEA	RMR				
Basic model	186.257	118	1.578	0.050	0.034	0.916	0.904	0.901	0.886

We can see that χ^2/df is 1.384, less than 2, RMSEA is 0.040, less than 0.05, which is excellent, RMR is 0.033, less than 0.05, and other indexes are greater than 0.9. The results illustrate that the effect model of learning capacity on the innovation performance of freight transportation service has relatively high reliability.

The standardized regression coefficient of OLC to the IPFLS is 0.323, and it is significant at the 0.05 level (see Table 16 and Figure 6). Hypothesis 3 is verified. The third criterion of the

mediating effect is that IPFLS regresses to OLC, and the condition of the significance of the regression coefficient is satisfied.

5.2.4. Test of Mediating Effect of OLC. Based on the conceptual model of the impact mechanism of RE on the IPFLS constructed in Figure 2, we set up the initial SEM (see Figure 7) and then use AMOS software to analyze the initial

TABLE 14: Estimate of RE influencing on IPFLS.

	Path		Estimate	SE	CR	P	Label
IPFLS	<---	RE	0.49	0.078	4.593	***	par_16
A7	<---	RE	0.626				
A6	<---	RE	0.536	0.138	6.478	***	par_1
A5	<---	RE	0.531	0.125	6.43	***	par_2
A4	<---	RE	0.589	0.142	6.963	***	par_3
A3	<---	RE	0.583	0.141	6.912	***	par_4
A2	<---	RE	0.597	0.151	7.032	***	par_5
A1	<---	RE	0.499	0.133	6.119	***	par_6
C1	<---	IPFLS	0.533				
C2	<---	IPFLS	0.58	0.187	6.125	***	par_7
C3	<---	IPFLS	0.448	0.158	5.163	***	par_8
C4	<---	IPFLS	0.531	0.178	5.798	***	par_9
C5	<---	IPFLS	0.455	0.165	5.219	***	par_10
C6	<---	IPFLS	0.494	0.169	5.53	***	par_11
C7	<---	IPFLS	0.521	0.165	5.731	***	par_12
C8	<---	IPFLS	0.448	0.156	5.161	***	par_13
C9	<---	IPFLS	0.385	0.155	4.6	***	par_14
C10	<---	IPFLS	0.46	0.172	5.264	***	par_15

***Significance level $p < 0.001$.

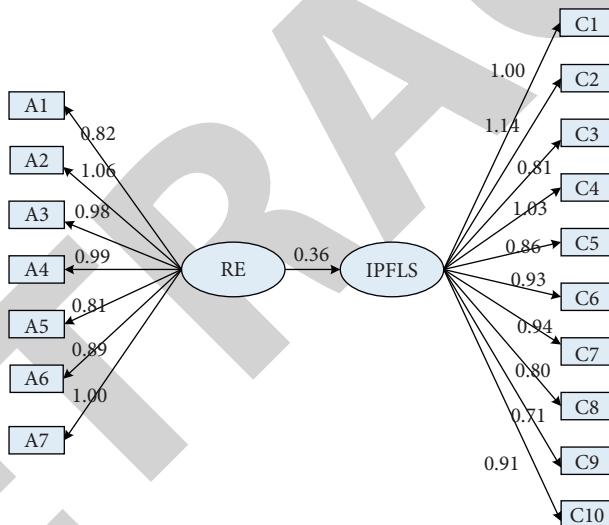


FIGURE 5: Model of RE influencing on IPFLS.

TABLE 15: Fitting results of OLC influencing IPFLS.

	Fitting index		χ^2	df	χ^2/df	RMSEA	RMR	GFI	IFI	CFI	TLI
	χ^2	df									
Basic model	185.4	134	1.384		0.04	0.033	0.921	0.923	0.921	0.921	0.91

SEM. The fitting results are obtained as shown in Table 17, χ^2/df is 1.452, less than 2, RMSEA is 0.044, less than 0.05, and RMR is 0.039, less than 0.05. However, the values of GFI, IFI, CFI, and TLI are all less than 0.9. It illustrates that there is room for improvement in the model. After four corrections, the values of GFI, IFI, CFI, and TLI become all greater than 0.9. It indicates that the model has a high fitting degree. After the addition of OLC variable, the regression coefficient between RE and IPFLS is still significant, but it is lower than

that in Step 2 (from 0.49 to 0.42), which indicates that OLC partially mediates the relationship between RE and IPFLS. Hypothesis 4 is verified. The final structural equation model is shown in Figure 8.

5.3. Hypothesis Verification and Model Interpretation

5.3.1. Hypothesis Verification. According to the above test, the hypotheses proposed in this study are verified as follows:

TABLE 16: Estimate of OLC influencing IPFLS.

	Path	Estimate	SE	CR	P	Label
IPFLS	<---	OLC	0.323	0.074	3.276	0.001
B8	<---	OLC	0.539			
B7	<---	OLC	0.605	0.165	6.306	***
B6	<---	OLC	0.644	0.175	6.525	***
B5	<---	OLC	0.505	0.16	5.631	***
B4	<---	OLC	0.429	0.154	5.018	***
B3	<---	OLC	0.391	0.142	4.666	***
B2	<---	OLC	0.545	0.179	5.925	***
B1	<---	OLC	0.54	0.157	5.89	***
C1	<---	IPFLS	0.521			
C2	<---	IPFLS	0.584	0.196	5.996	***
C3	<---	IPFLS	0.46	0.166	5.159	***
C4	<---	IPFLS	0.524	0.185	5.623	***
C5	<---	IPFLS	0.444	0.171	5.033	***
C6	<---	IPFLS	0.5	0.177	5.455	***
C7	<---	IPFLS	0.524	0.173	5.622	***
C8	<---	IPFLS	0.454	0.163	5.113	***
C9	<---	IPFLS	0.381	0.161	4.491	***
C10	<---	IPFLS	0.468	0.181	5.223	***

***Significance level $p < 0.001$.

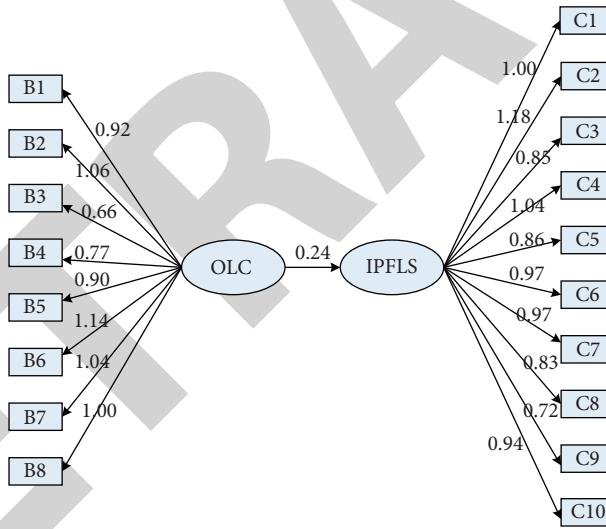


FIGURE 6: Model of OLC influencing IPFLS.

Hypothesis 1: RE has a positive effect on IPFLS, with a standardized coefficient of 0.32 and a probability level of 0.001.

Hypothesis 2: RE has a positive effect on OLC, with a standardized coefficient of 0.44 and a probability level of 0.001.

Hypothesis 3: OLC has a positive effect on IPFLS, with a standardized coefficient of 0.11 and a probability level of 0.05.

Hypothesis 4: As shown in Figure 8, RE, OLC, and IPFLS are simultaneously entered into the SEM for path

analysis. The results show that when the regression coefficients between RE and OLC and between OLC and IPFLS are significant, the regression coefficient between RE and IPFLS is also significant. It indicates that OLC partially mediates the relationship between RE and IPFLS.

5.3.2. Model Interpretation. In the AMOS software, the index of Square Multiple Correlations depicts the explanatory degree of RE on IPFLS. In this study, the degree to which OLC and IPFLS are explained is shown in Table 18.

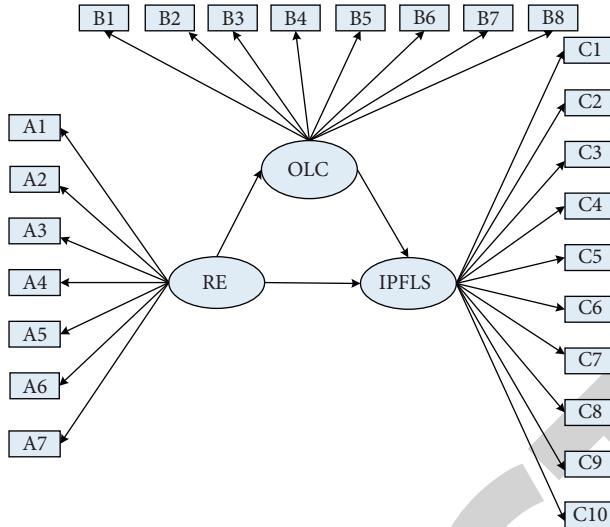


FIGURE 7: Initial model of mediating effect of OLC.

TABLE 17: Fitting results of mediating effect of OLC.

	Fitting index								
	χ^2	df	χ^2/df	RMSEA	RMR	GFI	IFI	CFI	TLI
Initial model	395.040	272	1.452	0.044	0.039	0.885	0.888	0.885	0.873
Modified model 1	389.224	271	1.436	0.043	0.039	0.886	0.892	0.889	0.877
Modified model 2	363.881	270	1.348	0.038	0.037	0.892	0.914	0.912	0.902
Modified model 3	349.997	269	1.301	0.036	0.036	0.896	0.926	0.924	0.915
Modified model 4	335.014	268	1.250	0.033	0.036	0.900	0.939	0.937	0.930

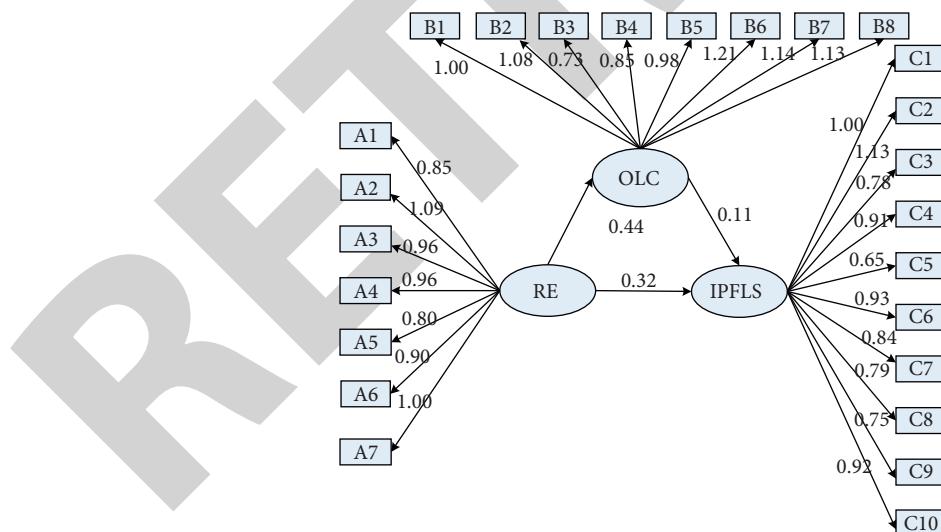


FIGURE 8: The final modified model of mediating effect of OLC.

TABLE 18: Results of model interpretation.

	OLC 0.527	IPFLS 0.684
RE	\checkmark	
OLC		\checkmark

The results show that the explanatory degree of OLC is 0.527, and the explanatory degree of IPFLS reaches 0.684.

6. Conclusions and Management Implications

6.1. Conclusions and Discussions. This study focuses on explaining the mediating mechanism of OLC on the relationship between RE and IPFLS. Theoretical construction and empirical research approach are adopted. Drawing on Social Network Theory and Organizational Learning Theory, a theoretical model and four research hypotheses are presented. A sample of 236 respondents from freight transportation firms in China is analyzed to test the hypotheses. The results show that the hypotheses proposed in this paper are verified. The research conclusions are as follows.

Firstly, RE has a positive influence on OLC and IPFLS. Data analysis shows that RE (including relationship durability, degree of cooperation, closeness of interaction, and satisfaction with the relationship) in the network has a significant positive effect on the flow of knowledge between firms, the learning capacity of firms, and IPFLS. The conclusion supports the viewpoints of Kalmuk and Acar [21], Gomes and Wojahn [63], and Hong et al. [32].

Secondly, OLC partially mediates the relationship between RE and IPFLS. Data analysis shows that, after the addition of the OLC variable, the impact of RE on IPFLS is still significant. It indicates that OLC plays a partial mediating role in the mechanism of the impact of RE on IPFLS. Namely, in the case of appropriate relationship embedding, communication and coordination between enterprises can promote the transmission of knowledge and opportunities for mutual learning, so as to obtain knowledge and improve innovation performance. The conclusion supports the viewpoints of Xu [21] and Hong et al. [32].

Under demand-dominant logic, service has become an indispensable and important factor in the survival and development of freight transportation enterprise. In the process of service innovation, freight transportation company acts as a living organization, and the improvement of learning ability directly determines innovation performance. Because freight companies mainly exist in the form of small owners, it is difficult to provide high-quality services based on their own capabilities. In order to meet the needs of cargo owners, freight transportation companies cooperate with other companies to innovate and try to meet the service needs of cargo owners in the logistics network. This paper verifies that RE can positively affect service innovation performance by promoting OLC. Although some meaningful conclusions have been drawn in this research, there are still some limitations. Due to the limitation of research conditions, this research only investigates the influence of RE. Future research could investigate the relationships between relational embedded configuration with external partners in different fields and IPFLS through OLC.

6.2. Management Implications. Nowadays, FLFs are facing fierce competition and differentiated needs of customers. They need to survive and maintain sustainable development through service innovation. From the research conclusions of this paper, FLFs can get the following management implications.

Firstly, FLFs need to improve the degree of relational embedding with external partners and enhance the quantity and quality of the interaction. It would be beneficial to raise the relationship with partners to the strategic height and pay attention to the quality and long-term maintenance of the relationship with partners.

Secondly, FLFs could give full play to the mediating effect of OLC and cultivate OLC. Specifically, FLFs could cultivate OLC from two aspects. On one hand, it is vital for a firm to take its relationship with external partners as a strategic resource. A firm could record and track the whole process of acquiring knowledge from partners. Above all, it needs to summarize the successful experience and failure lessons to improve the ability to manage knowledge and resources between firms and finally transform these learning processes and learning ability into a firm's progress. On the other hand, a firm needs to arrange full-time employees to deal with matters of various external partnerships and is committed to the promotion of OLC. In addition to clarifying the responsibilities of employees, firms should give them sufficient training to improve their professional skills in relationship management and organizational learning, so that they can more effectively complete the tasks assigned to them by the firm.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflicts of interest.

Authors' Contributions

Pengxia Bai and Qian Li conceptualized the study, performed data curation, developed the methodology, and wrote the original draft. Qian Li was responsible for funding acquisition and project administration. Pengxia Bai and Chenlei Xue performed investigation. Qian Li and Lei Zhang provided resources and reviewed and edited the article. Qunqi Wu performed supervision and validation. Lei Zhang and Chenlei Xue performed visualization.

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