

Article

Factors Affecting Supply Chain Integration in Omni-Channel Retailing

Yue Liu ¹ and Guang Song ^{2,*} ¹ Renmin Business School, Renmin University of China, Beijing 100872, China² Beijing Laboratory of National Economic Security Early-Warning Engineering, Beijing Jiaotong University, Beijing 100044, China

* Correspondence: songguang@bjtu.edu.cn

Abstract: China's retail industry has vigorously developed an omni-channel retail strategy in the last few years. However, quantitative research on this development remains relatively scarce. This article addresses this by building a theoretical model of the relationships between internal supply chain integration, external supply chain integration and financial performance in omni-channel retailing and then verifies it by using a structural equation model to analyze 356 omni-channel retailers. The results show that in the case of omni-channel retailers, the supply chain's internal information integration has a significant positive impact on its external information integration and that the supply chain's internal process and internal organization integration significantly positively impact its external process and external organization integration. And it also shows the supply chain's external information integration and external organization integration positively impact omni-channel retailers' financial performance. However, the supply chain's external process integration is not found to have the same effect on financial performance. This study addresses a theoretical gap in the research on the impact of supply chain integration on firm performance in omni-channel retailing. In addition, it provides suggestions about how omni-channel strategies can be effectively implemented in China's retail industry.

Keywords: omni-channel; retail industry; SEM; supply chain integration



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1. Introduction

China's Internet Development Report shows the country ranks first in the world for online retail transactions. In 2023, its online retail sales hit RMB 15.42 trillion, an increase of 11 percentage points compared to the year before. China's high-quality development of e-commerce has achieved positive results [1]. A multi-channel sales strategy has clear advantages over its single-channel counterpart when considered from the perspective of satisfaction of customer needs. However, the independent management of different channels and the differences in product prices and marketing methods mean that a conflict of interest will occur between channels, and the management costs rise. If different channels are not effectively integrated, the customer consumption experience will be negatively affected [2]. Omni-channel retail strategies have gradually emerged in recent years with the aim of eliminating these drawbacks and comprehensively improving consumers' shopping experience.

The era of mobile Internet retailing driven by information technology and consumer demand has arrived, and retailers must use advanced information technology to carry out omni-channel retailing [3]. Omni-channel retailing refers to company actions that combine and integrate as many retail channels as possible, with the aim of meeting customers' needs for a comprehensive shopping, entertainment and social experience. Consumers' shopping experience is seamlessly linked across different channels, and the pleasure of the consumption process is maximized. In contrast to the multi-channel model, this

alternative integrates various channels, irrespective of whether they are online or offline, with no difference in product price, customer experience or shared channel inventory [4–6]. Retailers have widely embraced the omni-channel retail strategy.

A Ministry of Commerce report confirms the retail industry's retail capital is deeply integrated into the country. Firstly, large-scale Internet companies have penetrated offline at a large scale, the value of physical retail has been highlighted and high-quality offline retail brands have been fully recognized by the capital market. Secondly, offline companies are also accelerating their integration to build online retail platforms [7,8]. The report also highlighted how retailers have vigorously developed omni-channel diversified businesses and gradually transformed into new retail enterprises with comprehensive integrated services. Many leading department store companies are boldly innovating and actively transforming themselves on the basis of bridging their online and offline sales channels. Their comprehensive competitiveness has improved as a result.

Logistics is one of the core elements of an omni-channel retail strategy [9]. A retailer's ability to realize an omni-channel strategy largely depends on its integration of logistics decisions and activities. Omni-channel retailing has experienced a shift from the independent operation of online and offline warehousing and distribution to the integration of all aspects. This shift has occurred with the intention of building omni-channel retail service capabilities and providing customers with a convenient and even ultimate purchase experience. The increased number of channels has resulted in omni-retail logistics becoming increasingly complex and has meant order fulfillment is no longer a simple linear process. In addition, a low level of cross-channel logistics integration will increase costs and reduce competitive advantage [10].

Omni-channel integration can enable retailers to share their inventory, facilities and processes in a way that will achieve cross-channel order integration and improve the whole supply chain's competitive advantage. Researchers also maintain that adopting an omni-channel retail strategy will reduce the supply chain's transaction costs, improve overall retailer performance and improve customers' consumption experiences [11,12]. Strong policy support has enabled China's retail industry to rapidly develop. In recent years, China's retailers have transitioned from a multi-channel to an omni-channel strategy, with the aim of providing consumers with a seamless online and offline shopping experience, in both online and offline channels.

The 14th Five Year Plan of China states that the modernization and diversification of the supply chain should be accelerated. Under the new development pattern, the role of retail enterprises in the supply chain has become increasingly prominent. Supply chain integration of retail enterprises is of great significance to enhancing the overall efficiency of the supply chain and international competitiveness [13]. It is therefore a necessary measure to achieve sustainable development under the new development pattern. Therefore, the realization of omni-channel supply chain integration by retailers is a necessary measure to achieve sustainable development under the new development pattern.

However, the omni-channel retail strategy is still in an early stage, and theoretical guidance is lacking. First, in addressing the question of how supply chain integration affects firm performance, most of the research focuses on manufacturing firms, and only a few studies have considered retailers [14]. Second, in addressing the question of the impact of the implementation of supply chain integration on omni-channel retailers' performance, most of the studies have tended to be qualitative, with only a few quantitative contributions [15]. In recognizing this gap, some researchers have called for more quantitative studies to be involved [14].

To fill this research gap, this study divides supply chain integration into horizontal internal and external vertical information and process and organization integration, with the aim of (1) exploring the impact of internal information integration on external information integration; (2) exploring the impact of internal process integration on external process integration; (3) exploring the impact of internal organization integration on external organization integration; (4) exploring the impact of external supply chain integration on

omni-channel retailers' financial performance. By answering the above questions, this study will provide quantitative results that will provide insight into how the implementation of supply chain integration affects omni-channel retailers' performance. And it will also provide guidance to omni-channel retailers in China who are seeking to achieve sustainable development.

Section 2 presents the related literature; Section 3 presents the research hypotheses; Section 4 reports the methodology, results and findings; Section 5 outlines the discussions and implications; Section 6 concludes the article and proposes future research.

2. Literature Review

2.1. Omni-Channel Retail Logistics

Omni-channel retail logistics refers to the order processing, warehousing, transportation and distribution services that retailers or third-party logistics companies provide to customers through different channels with the aim of meeting customers' logistics needs. In omni-channel retailing, it is only logistics, which involves direct face-to-face contact with customers, that directly affects customers' shopping experience. It has therefore been claimed that the success of omni-channel retail development mainly depends on whether omni-channel retail logistics services successfully meet customer needs [9].

In the process of transforming from the multi-channel to the omni-channel model, retailers need to analyze their logistics systems (both forward and reverse logistics) with the aim of achieving all-round changes [16–19]. And their operation management systems should also introduce corresponding changes [20]. This can be summarized as follows:

- (1) Inventory: Retailers have gradually evolved from separate inventory systems for each channel to an integrated inventory system.
- (2) Sorting: Retailers with integrated inventory systems tend to integrate the sorting of goods from various channels into a common sorting area.
- (3) Variety of goods: Omni-channel retailers tend to offer more types of products to customers through online retail channels.
- (4) Delivery: Under the omni-channel mode, retailers can provide both home delivery and self-pick-up services in stores for orders. The choice of model is related to the region, retailer industry and customer behavior. Customers can choose to go into the store to select and buy or choose "pick up online" and then select "home delivery service". The delivered goods can come from offline physical stores, retailer distribution centers or directly from the supplier's distribution center.
- (5) Reverse logistics: In operating under the omni-channel retailing context of online orders, customers can choose, after considering a variety of factors (including the product, retailer industry and density of offline physical stores), to send the goods to a physical store or a return center.
- (6) Organization: Omni-channel retailers tend to integrate organizational departments that were originally separated into different channels.
- (7) Information systems: Omni-channel retailers tend to integrate ERP systems that originally served specific channels and use integrated ERP systems that can access real-time data across channels.

The level of online sales, the scale of the sales network, the number of offline sales staff and the time to develop online channels have all been found to affect omni-channel retailers' logistics integration [21]. And a theoretical framework has been developed for the integration mode of omni-channel retail logistics that consists of the inventory, procurement, sorting, distribution, return, organization and information systems [16]. After sorting through the research on omni-channel retail logistics, we find it mainly focuses on the concepts of omni-channel retail logistics, the realization mode of omni-channel retailing, the reform of omni-channel retail logistics systems and a range of influencing factors. But only a few quantitative analyses verify the effectiveness and mechanism of the factors that influence omni-channel retailers, and this is the gap that this paper will fill.

2.2. Supply Chain Integration

Supply chain integration refers to strategic cooperation between firms and their supply chain partners that integrates and optimizes internal and external operational processes, with the aim of achieving efficient product, service, information and capital flows, in order to provide maximum value to customers quickly and at low cost [22]. Supply chain integration can be divided into internal and external integration.

Researchers note the supply chain's internal integration includes concurrent engineering, process design and standardization [23]. It has been presented as a process through which cross-functional integration enables better services to be provided to customers [24]. Other researchers cite TMS (top management support) in particular and IT (information technology) as internal corporate resources that facilitate integration [25].

The external integration of the supply chain has been defined as the process of managing the logistics and information flow for external suppliers and customers [26]. It has been noted it includes relationships with suppliers, the development of suppliers and closer customer relationships, and it has also been observed that it helps firms unify their suppliers and customers for product design and development [23]. Zhang et al. (2015) propose a conceptual model of the integration of supply chain partners that has four integration elements, specifically strategy, management, operation and foundation. If supply chain integration is to establish interest alliances, then economic, information, knowledge, material, organizational, planning and control, process (operational level) and strategic integrations (strategic level) between supply chain partners are all required [27].

2.3. The Impact of Supply Chain Integration on Firm Performance

Some researchers have explored the "black box" that connects supply chain integration and firm performance and concluded there is no direct connection between them. They instead propose that the former indirectly positively affects the latter by operating through internal lean production processes [28]. They have found that external integration of the supply chain positively impacts firm operational performance and that the supply chain's internal integration indirectly impacts operational performance by affecting the supply chain's external integration [29]. The impact of supply chain integration on firm financial performance has also been found to be reverse U-shaped, which implies that "over" and "under" integration of the supply chain will weaken its positive impact on firm financial performance [30]. Some researchers have also focused on how supply chain integration impacts firm performance. It has been suggested that supply chain integration can help improve financial efficiency (e.g., by reducing costs, increasing profits and improving recovery rates) [22,25,28,31], operational efficiency (e.g., by shortening the delivery time and inventory levels and by improving flexibility and delivery reliability) [22,28,29] and firm competitiveness [32]. For example, for external supply chain integration, some researchers have demonstrated that supplier integration and customer integration positively impact firm performance and have suggested the supplier integration effect is more significant [25]. Others suggest supply chain integration impacts customer satisfaction and firm financial performance [31]. For internal supply chain integration, some researchers have found that internal integration through information technology positively impacts firm operational and financial performance [33]. Others have analyzed the relationship between IT, SCI and firm performance and also concluded that internal supply chain integration can positively affect firm performance [34].

In further exploring this question, researchers have also proposed that supply chain integration at any level will positively impact firm financial performance [35]. Exploring the impact of supply chain integration on firms' competitive advantage has made it possible to identify that supply chain process integration is an important indicator of a firm's competitive advantage [32]. And studies have revealed that the integration of third-party logistics integration will provide firms with cost advantages that will positively impact their financial performance [36].

The current studies of how supply chain integration impacts firm performance mostly focus on manufacturing firms [30,33,34] and a small number of third-party logistics providers [29]; however, only a few studies have addressed retailers [37]. And studies of the impact of supply chain integration on firm performance offer different conclusions, in large part due to their different definitions of the supply chain integration dimensions. This paper takes omni-channel retailers as the research object in order to examine the impact of omni-channel supply chain integration on retailer financial performance in the context of omni-channel retailing in the Chinese market environment. And it seeks to provide guidance to Chinese retailers that will help them to achieve sustainable development.

3. Research Hypotheses

3.1. Model Building

This study mainly analyzes the impact of supply chain integration on the financial performance of retailers in an omni-channel retailing context. The literature (on the impact of supply chain integration on firm performance) divides supply chain integration into internal and external supply chain integration. Researchers have also shown that the supply chain's internal integration plays a crucial role in its connection to the external integration of the supply chain (i.e., between supplier and customer integration) [22]. And supply chain integration has been shown to positively impact firms' financial performance. This study therefore argues that the supply chain's internal integration affects its external integration, in a way that, in turn, positively affects a firm's financial performance.

The literature on omni-channel retailing shows that omni-channel retailers need to work across multiple dimensions when integrating supply chains. Researchers have been most preoccupied with supply chain information, process and organization integration. In referring to information, they note omni-channel retailers tend to integrate ERP systems that originally served specific channels and turn them into integrated ERP systems that can access real-time data across channels. Retailers who develop omni-channel strategies therefore need to integrate supply chain information. Activities from the entire supply chain can be seamlessly connected through process integration, and retailers also need to integrate supply chain processes when transforming from a multi-channel to an omni-channel format. In organizational terms, omni-channel retailers need to integrate the organizational departments that previously included different channels and therefore also require the integration of supply chain organizations [16].

This study will use the three dimensions of information, process and organization integration to measure supply chain integration and hypothesize a number of relationships (between internal and external information integration, internal and external process integration and internal and external organization integration) for omni-channel retailers. In doing so, it will assess their impact on retailers' financial performance and use the model to verify whether the hypotheses are correct.

3.2. Research Hypotheses

Supply chain integration emphasizes close links and close cooperation between different functional departments within a firm and between the firm and its supply chain partners. The sharing of information is the basis on which this goal is achieved [38]. It has been suggested that retailers who develop an omni-channel retail strategy can their increase corporate value by sharing information between channels, and this is because the integration of information not only facilitates the integrated management of channels but also provides customers with a seamless cross-channel shopping experience [5].

In order to realize information integration through an omni-channel strategy, it is necessary to build information systems that support information sharing between departments and between firms and their supply chain partners, as this will make it possible to manage business processes within and between organizations [39]. It has previously been noted that information systems can overcome complexity when dealing with channel integration issues [22]. And information integration can help retailers to better exchange

data between cross-channel functional departments and with supply chain partners, in a way that will improve their operational efficiency and customer experience through joint decision-making [40]. On this basis, we can therefore infer that supply chain information integration is necessary for retailers in an omni-channel retailing context.

One of the main elements of supply chain management is to establish a connection with, and facilitate communication between, supply chain partners by managing the business activities within and between firms [32]. This is why process integration is considered to be one of the most important aspects of supply chain integration. In an omni-channel retailing context, it improves the flexibility of order fulfillment and product delivery, provides customers with a superior shopping experience and increases the competitive advantage of omni-channel retailers [41]. The purpose of process integration is to realize a seamless connection across the supply chain [27]. In the case of omni-channel retailing, order fulfillment requires the support of forward and reverse logistics activities [18]. Some researchers therefore assert that inventory, distribution, returns and channel changes are the main aspects of omni-channel order fulfillment and claim that linking with supply chain partners can help integrate these aspects, improve supply chain coherence, reduce supply chain transaction costs and meet differentiated and diversified customer needs [35]. On this basis, we propose that it is necessary for retailers to integrate supply chain processes in an omni-channel retailing context.

Supply chain organization integration enables efficient supply chain processes by facilitating communication and collaboration between cross-functional business units and supply chain partners [27]. Research has shown that internal and external integration between organizations can help improve the flexibility of cross-channel management and promote the efficient operation of online and offline sales channels [32]. And retailers need to facilitate organization integration by promoting communication and collaboration between different channel departments and setting up cross-channel and cross-company working teams who will respond to diverse customer needs [27]. It is therefore reasonable to infer that it is necessary for retailers to integrate their supply chain organizations in an omni-channel retailing context.

With regard to the relationship between internal and external supply chain integration, it has been claimed that “internal supply chain integration” refers to the process through which firms seek to meet customer demand and work more effectively to coordinate strategies, activities and processes from internal different departments so that they are collaborative and synchronized. “External supply chain integration” refers to the extent to which a firm successfully coordinates strategies, activities and processes into cooperative and synchronized processes by allying with external supply chain partners [22]. It has been found that external integration of the supply chain positively impacts firm performance and that internal integration of the supply chain indirectly affects firm performance by influencing external supply chain integration [29]. It has also been demonstrated that internal and external supply chain integration influence each other. In acknowledging and referring to these contributions, this article puts forward the following hypotheses.

Hypothesis 1 (H1). *Internal supply chain information integration significantly positively impacts external supply chain information integration in an omni-channel retailing context.*

Hypothesis 2 (H2). *Internal supply chain process integration significantly positively impacts external supply chain process integration in an omni-channel retailing context.*

Hypothesis 3 (H3). *Internal supply chain organization integration significantly positively impacts external supply chain organization integration in an omni-channel retailing context.*

Studies of omni-channel retailing have concluded that omni-channel supply chain integration can effectively respond to customer needs [18,35]. And studies that reference different backgrounds have confirmed how supply chain integration can positively impact firm performance [42].

Researchers have also identified other important impacts of supply chain integration, including that supplier integration significantly positively impacts financial performance; that customer integration indirectly contributes to financial performance by affecting customer satisfaction and that external supply chain integration positively impacts firm financial performance [31].

The relationship between supply chain integration and firm financial performance has also been explored, and it has been found that supply chain integration at any level positively affects a firm's financial performance [35]. But Zhao et al. (2015) find the impact of supply chain integration on a firm's financial performance is reverse U-shaped, which means excessive or insufficient integration will weaken its impact [30]. On the basis of these studies, we propose the following hypotheses:

Hypothesis 4 (H4). *External supply chain information integration significantly positively impacts firm financial performance in an omni-channel retailing context.*

Hypothesis 5 (H5). *External supply chain process integration significantly positively impacts firm financial performance in an omni-channel retailing context.*

Hypothesis 6 (H6). *External supply chain organization integration significantly positively impacts firm financial performance in an omni-channel retailing context.*

After combining these hypotheses, we propose the following theoretical model (see Figure 1).

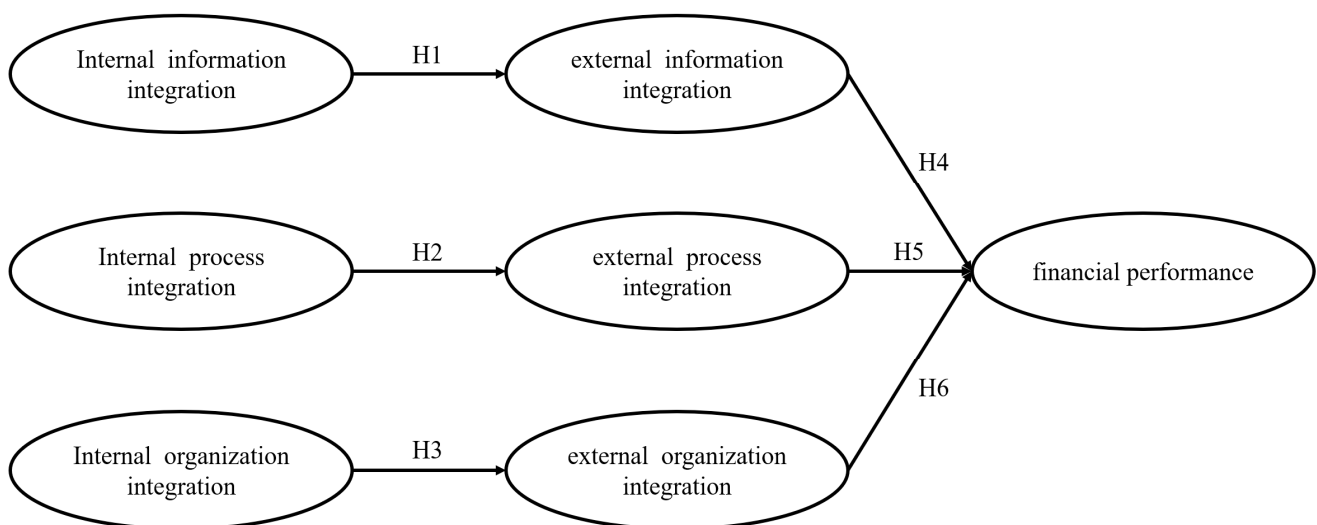


Figure 1. Theoretical model.

4. Methodology

4.1. Study Design

We then established a specific research design. First, questionnaires were used as a research tool to empirically investigate Chinese omni-channel retailers. Second, the questionnaire's reliability and validity were examined, which demonstrated they could be analyzed by applying a structural equation model. Structural equation modeling hypothesis testing then occurred.

4.2. Measures of Constructs

The indicators are mainly based on previous studies and include a total of 7 latent and 34 measurable variables. The variables measured by the questionnaire are as follows (see Table 1):

Table 1. Measurable variables.

Coding	Measurable Variables	Reference(s)
Internal Information Integration (II)	II1 The extent of cross-departmental data integration within the company	[39,40]
	II2 The extent to which centralized information systems and databases are provided within the company	
	II3 The extent to which information is shared in “real time” on a cross-departmental basis	
	II4 The extent to which the company has established internal information sharing and confidentiality mechanisms	
External Information Integration (EI)	EI1 The extent to which companies share information with supply chain partners	[41,42]
	EI2 The extent to which companies maintain frequent and close contact with supply chain partners	
	EI3 The extent to which companies and supply chain partners are connected to information systems	
	EI4 The extent to which companies exchange information with supply chain partners	
	EI5 The extent to which companies have established external information sharing and confidentiality mechanisms with supply chain partners	
Internal Process Integration (IP)	IP1 The extent to which standardized operational processes are developed within the company	[27,32]
	IP2 The extent to which companies develop decision-making mechanisms and processes that all departments participate in	
	IP3 The extent to which inventory management is shared on a cross-departmental basis within the company	
	IP4 The extent to which warehouse management and operations are shared on a cross-departmental basis within the company	
	IP5 The extent to which order execution is managed jointly by various departments within the company	
	IP6 The extent to which various departments within the company jointly manage returns and exchanges	
External Process Integration (EP)	EP1 The extent to which companies and supply chain partners jointly develop improvement plans for operational process enhancements	[27,32]
	EP2 The extent to which companies work with supply chain partners on inventory management	
	EP3 The extent to which companies work with supply chain partners on warehouse management and operations	
	EP4 The extent to which companies work with supply chain partners on order fulfillment management	
	EP5 The extent to which companies work with supply chain partners on returns and exchanges management	
Internal Organization Integration (IO)	IO1 The extent of the interlinkage between various departments within the company	[27,32]
	IO2 The extent to which various departments within the company communicate with each other	
	IO3 The extent to which companies encourage collaboration among employees on a cross-departmental basis	
	IO4 The extent to which companies have established cross-departmental teams for process improvement	
	IO5 The extent to which companies hold regular meetings to organize cross-departmental communication	

Table 1. Cont.

Coding	Measurable Variables	Reference(s)
External Organization Integration (EO)	EO1 The extent of mutual trust and dependence between the company and its supply chain partners	[30,35]
	EO2 The extent to which the company views its supply chain partners as part of the company itself	
	EO3 The company has established a team to communicate and cooperate with supply chain partners	
	EO4 The extent to which the company's organizational culture is aligned with its supply chain partners	
Financial Performance (FP)	FP1 The extent to which the company's revenue has risen	
	FP2 The extent to which the company's total operating costs have decreased	
	FP3 The extent to which the company's profitability has risen	
	FP4 The extent to which the company's return on assets has improved	
	FP5 The extent to which the company's facilities and equipment utilization have increased	

(1) The impact of internal supply chain integration on external supply chain integration: In referring to the previous research results of scholars, this study measures three dimensions: supply chain information, supply chain process and supply chain organization integration. Each contains two dimensions of internal (between departments) and external (with supply chain partners) integration.

Internal information integration is measured according to the integration of data, the construction of information systems and the degree of information sharing between departments; *external information integration* is measured according to the sharing of information, the closeness of connections, the interface of information systems, the exchange of information and the construction of confidentiality mechanisms with supply chain partners; *internal process integration* is measured according to the standardization of operation processes, process involvement, inventory management, warehouse management and operation, order and return management between departments; *external process integration* is measured according to process improvement, inventory management, warehouse management and operation, order and return management with supply chain partners; *internal organization integration* is measured by communication between departments and collaboration between employees; *external organization integration* is measured by communication ability, collaboration ability and the level of trust between retailers and their supply chain partners.

(2) The impact of external supply chain integration on retailers' financial performance. Financial performance is measured according to operating revenue, profit margin and the return on assets and operation efficiency.

4.3. Sampling and Data Collection

This paper used the questionnaire survey method to collect sample data, on the basis that it is the most frequently used and convenient empirical research method. Registered members of the China General Chamber of Commerce (CGCC) were the main research object, and the data were collected by distributing questionnaires. The questionnaire is mainly divided into two parts. The first part evaluates the overall characteristics of a retailer's supply chain integration, including its information, process and organization integration capabilities. The second part investigates its financial performance. All the questions are measured on a 5-point Likert scale, which ranges between 1 ("completely disagree") and 5 ("completely agree").

A total of 500 registered members of the Chamber were randomly selected as the respondents, and managers were invited to answer through anonymous emails. The survey

period was four weeks. Most of the companies accepted the survey and responded, but a small number did not accept the survey or provide fully relevant information, as they did not have any omni-channel retail strategies in place. A total of 356 questionnaires were usable, meaning the overall questionnaire efficiency was 71.2 percent. Table 2 provides descriptive statistics ($n = 356$) on respondent position, company nature, time for which the company has operated in the Chinese market and annual revenue.

Table 2. Descriptive statistics.

	Description	Percentage
Respondent Position	General manager	33
	Supply chain manager	67
Nature of Company	State-owned enterprises	38
	Private companies	45
	Joint ventures	12
	Foreign companies	5
The company's operating time in the Chinese market	<5 years	15
	5–10 years	20
	11–15 years	23
	16–20 years	15
	>20 years	27
Annual revenue (million RMB)	<50	20
	50–100	23
	100–200	10
	200–2000	23
	>2000	24

Of the sample, almost one-third (33 percent) were general managers and almost two-thirds (67 percent) were supply chain department managers; they all had a clear understanding of the current status of their company's omni-channel retail strategy and the extent of supply chain integration, both within their company and with supply chain partners. The sample included state-owned enterprises, private companies, joint ventures and foreign-funded enterprises and therefore comprehensively covers the contemporary Chinese market. It included new enterprises that have operated in the Chinese market for less than five years and older counterparts who have operated for more than 20 years; in addition to enterprises with an annual revenue of less than 50 million yuan and counterparts with an annual revenue of more than 2 billion yuan.

4.4. Factor Analysis

4.4.1. KMO Test and Bartlett's Sphericity Test

The Kaiser–Meyer–Olkin (KMO) test and Bartlett's sphericity test are the methods that are most frequently used to test whether a sample is suitable for exploratory factor analysis. When the KMO value is closer to 1, it is suitable for exploratory factor analysis. This paper used an SPSS 21.0 factor analysis to perform the KMO and Bartlett's sphericity tests—the results are shown in Table 3.

Table 3. KMO and Bartlett's sphericity tests.

	KMO value	0.830
Bartlett's sphericity test	df	703
	Sig.	0.000

The results show the study sample's KMO value was 0.830, which indicates it was suitable for factor analysis. And the Bartlett's sphericity test value was 703 with $p < 0.001$, which also confirmed this.

4.4.2. Exploratory Factor Analysis

Factor analysis was performed to analyze the interrelationships among many variables and to explain them in terms of their common underlying factors. The information contained in the original variables was organized into a smaller set of dimensions with a minimum loss of fidelity. In this study, exploratory factor analysis (EFA) was first employed using SPSS 21.0. Using the principal component analysis method, 35 measurable variables were loaded onto seven factors, as shown in Table 4. The total variance explained by the seven factors was 0.786, and the Cronbach's α of each group was higher than the recommended 0.70 benchmark [43], indicating the study sample passed the reliability test.

Table 4. Rotating component matrix.

	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6	Component 7
II1	0.582						
II2	0.543						
II3	0.748						
II4	0.778						
EI1		0.574					
EI2		0.712					
EI3		0.841					
EI4		0.810					
EI5		0.643					
IP1			0.823				
IP2			0.843				
IP3			0.896				
IP4			0.888				
IP5			0.863				
IP6			0.797				
EP1				0.795			
EP2				0.822			
EP3				0.828			
EP4				0.870			
EP5				0.842			
IO1					0.887		
IO2					0.889		
IO3					0.898		
IO4					0.843		
IO5					0.863		
EO1						0.631	
EO2						0.633	
EO3						0.698	
EO4						0.566	
FP1							0.881
FP2							0.836
FP3							0.917
FP4							0.912
FP5							0.898
average value	3.957	3.772	2.557	2.619	4.142	3.767	3.886
standard deviation	0.915	0.879	1.221	1.125	0.818	0.862	0.862
total variance explained	0.209	0.359	0.487	0.588	0.679	0.749	0.786
Cronbach's alpha	0.84	0.88	0.944	0.949	0.924	0.882	0.943

4.4.3. Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was then conducted using SPSS Amos 21.0. By drawing and fitting the model, we assessed the adequacy of the goodness of fit of the underlying factor structure. The results of the confirmatory factor analysis and the model fit are summarized in Tables 5 and 6. Table 6 shows that the model was acceptable because the overall model fit was adequate based on the results of the main fit indices (RMSEA = 0.070, CFI = 0.965, GFI = 0.949, AGFI = 0.918 and TLI = 0.953).

Table 5. Confirmatory factor analysis results.

	Variable	Non-Standardized Factor Loading	Standardized Factor Loading	SE	T-Value	R ²
II	II1	1.000	0.746			0.557
	II2	1.139	0.723	0.087	13.035	0.522
	II3	1.120	0.785	0.079	14.156	0.616
	II4	1.074	0.771	0.077	13.909	0.594
EI	EI1	1.000	0.763			0.583
	EI2	0.775	0.711	0.057	13.524	0.505
	EI3	1.074	0.830	0.067	16.114	0.690
	EI4	1.033	0.813	0.066	15.737	0.661
	EI5	0.923	0.756	0.064	14.508	0.572
IP	IP1	1.000	0.781			0.610
	IP2	0.890	0.787	0.043	20.894	0.620
	IP3	1.077	0.963	0.030	36.450	0.927
	IP4	1.101	0.954	0.031	35.264	0.911
	IP5	1.000	0.899			0.808
	IP6	0.847	0.773	0.042	20.109	0.597
EP	EP1	1.000	0.834			0.696
	EP2	1.124	0.888	0.052	21.784	0.789
	EP3	1.138	0.899	0.051	22.241	0.807
	EP4	1.105	0.911	0.048	22.800	0.830
	EP5	1.156	0.907	0.051	22.640	0.823
IO	IO1	1.000	0.717			0.513
	IO2	1.125	0.871	0.070	16.161	0.759
	IO3	1.289	0.919	0.076	17.037	0.845
	IO4	1.301	0.872	0.080	16.174	0.760
	IO5	1.146	0.856	0.072	15.881	0.733
EO	EO1	1.000	0.860			0.740
	EO2	1.066	0.876	0.051	22.631	0.767
	EO3	0.898	0.788	0.050	17.858	0.621
	EO4	0.863	0.708	0.057	15.254	0.502
FP	FP1	1.000	0.909			0.827
	FP2	1.014	0.869	0.040	25.364	0.755
	FP3	1.079	0.972	0.030	35.537	0.945
	FP4	1.012	0.943	0.031	32.160	0.892
	FP5	0.954	0.915	0.033	29.131	0.837

Table 6. Model fit results.

χ^2	df	χ^2/df	GFI	AGFI	CFI	RMSEA	TLI
1423.656	507	2.808	0.949	0.918	0.965	0.070	0.953

Convergent validity was tested using a t-value that was statistically significant to the factor loading [44]. Table 5 shows that all the t-values exceeded the critical ratio at the 0.05 level of significance. Therefore, these 35 variables were significantly related to the specific factor construct, and we could verify the posited relationships among the variables and constructs. Item reliability refers to the R² value of the observed variables, and these were accounted for by the latent variables influencing them. Thus, R² could be used to measure the reliability of the observed items [45]. Table 5 shows that the R² values of all the variables were greater than 0.3, indicating the acceptability of the results [46]. Thus, the t-value and R² values further provided sufficient evidence of convergent validity.

4.5. Discriminate Validity and Construct Validity

Table 7 shows the AVE values all exceeded 0.5, which indicates they had good discriminate validity.

Table 7. Comparison of AVE and squared correlation variable coefficients.

	AVE	II	EI	IP	EP	IO	EO	FP
II	0.572	1						
EI	0.785	0.449	1					
IP	0.745	0.001	0.004	1				
EP	0.789	0.006	0.065	0.593	1			
IO	0.722	0.247	0.147	0.003	0.001	1		
EO	0.657	0.191	0.315	0.008	0.002	0.536	1	
FP	0.851	0.132	0.127	0.001	0.035	0.017	0.122	1

Table 8 shows all the construct validity values exceeded 0.5, which indicates they had good construct validity.

Table 8. Descriptive statistics and construct validity values.

	Average Value	Standard Deviation	Construct Validity
II	3.957	0.915	0.843
EI	3.772	0.880	0.883
IP	2.557	1.221	0.946
EP	2.620	1.125	0.949
IO	4.142	0.818	0.928
EO	3.767	0.862	0.884
FP	3.886	0.862	0.966

4.6. Structural Equation Model (SEM) Analysis

This study sought to analyze and verify the factors that influence omni-channel retailers' supply chain integration. The SEM model was applied in an empirical analysis that used SPSS 21.0 Amos software to test the hypothesized relationships (see Table 9).

Table 9. Structural equation model results.

Hypotheses	Path	β	SE	p	Results
H1	II \rightarrow EI	0.361	0.075	***	Supported
H2	IP \rightarrow EP	0.223	0.071	***	Supported
H3	IO \rightarrow EO	0.389	0.074	***	Supported
H4	EI \rightarrow FP	0.273	0.082	***	Supported
H5	EP \rightarrow FP	−0.168	0.041	0.007	not supported
H6	EO \rightarrow FP	0.486	0.078	***	Supported

Note: "****" means significant at the 0.01 level.

Table 9 shows almost all the variables pass the significance test, with the only exception being the (negative) path coefficient between "external supply chain process integration and financial performance". The negative coefficient of the path between external supply chain process integration and financial performance indicates that external supply chain process integration does not positively contribute to the financial performance of retailers who implement an omni-channel retail strategy.

5. Discussion and Implications

5.1. Discussion

5.1.1. The Impact of Internal Supply Chain Integration on External Supply Chain Integration

Hypotheses 1–3 were supported, indicating that internal supply chain information integration, internal supply chain process integration and internal supply chain organization integration significantly positively impact external supply chain information integration, external supply chain process integration and external supply chain organization integration in an omni-channel retailing context. These findings are consistent with previous research results that show internal integration of the supply chain will promote its external integration [29,37].

According to these results, omni-channel retailers can take measures such as the following to enhance their internal supply chain information integration: provide a centralized information system and central database, share information in real time and establish internal information sharing and confidentiality mechanisms. This will promote information exchange and maintain frequent and close contact between retailers and their supply chain partners [39,40]. They can take measures such as the following to enhance their internal supply chain process integration: internally develop the standardized operation process and formulate decision-making mechanisms and processes that all departments participate in. This will enable retailers and their supply chain partners to jointly develop improvement plans for operational processes and jointly conduct inventory management, warehouse management, order fulfillment management and return management [41,42]. Also, they can take measures such as the following to enhance their internal supply chain organization integration: encourage employees in each department to cooperate with each other, set up cross-departmental teams and hold regular meetings to enable communication between various departments. This will, in turn, promote mutual trust and dependence between retailers and their supply chain partners, encouraging the emergence of a team that will communicate and cooperate with their supply chain partners [27,32].

5.1.2. The Impact of External Supply Chain Integration on Financial Performance

Hypotheses 4 and 6 are supported, indicating that external supply chain information integration and external supply chain organization integration significantly positively impact firms' financial performance in an omni-channel retailing context. These findings are consistent with previous research results that show external integration of the supply chain will promote firm financial performance [31,35].

According to these results, omni-channel retailers can take measures such as the following to improve their financial performance: share information, maintain frequent and close contact and establish an external information sharing mechanism with their supply chain partners [39,40]. Also, they can set up teams to communicate and cooperate with supply chain partners and consider supply chain partners to be part of the company itself [27,32]. Then, there will be a high possibility that the retailer's financial performance will be improved. Higher revenues, lower total operating costs, higher profit margins, higher return on assets and higher facility utilization rates will be evidenced.

However, hypothesis 5 fails the test, indicating that external supply chain process integration (which means the retailer and its supply chain partners jointly develop improvement plans for the operational process and jointly perform inventory management and warehouse management, along with order fulfillment and exchange management) does not lead to improved financial performance. This conclusion may differ from previous research results for the following reasons: first, the current studies of how supply chain integration impacts firm performance mostly focus on manufacturing firms [30,33,34], and only a few studies have addressed retailers [37]; second, the previous literature has viewed external supply chain integration as a whole and overlooked the negative impact of external process integration of the supply chain [35].

Furthermore, this could be explained in a number of different ways. First, in engaging from the perspective of the study sample, we can see there is a significant gap between the retailers' external supply chain process integration capabilities and the other two capabilities. The descriptive statistics in Table 8 show that the mean value of the external supply chain process integration capabilities is the smallest, and the weak external supply chain process integration capabilities of the retailers in the sample do not improve the retailers' financial performance, which leads H5 to fail. Second, from a process integration perspective, external process integration with supply chain partners requires joint inventory management, warehouse management, order fulfillment management and return and exchange management. If these integrations are to be realized, retailers must consume a large amount of human and material resources and invest a lot of costs, which will result in the costs exceeding the benefits. This is therefore likely to negatively impact retailers' financial performance. Finally, when viewed from the current situation of an omni-channel retailing perspective, its development is still in the initial stage. In this stage, retailers are more concerned with integrating information and organization. Although process integration currently shows poorer performance than the integration of these two aspects, the integration of information and organization can promote the integration of the process in the near future. The study's test results for H5 cannot therefore totally negate the important role of supply chain process integration in the development of an omni-channel retail strategy.

5.2. Implications

The study findings have certain managerial implications for business managers who seek to effectively implement supply chain integration practices and can facilitate the implementation of retailers' omni-channel retail strategies.

5.2.1. Drive Information Integration within the Supply Chain

Effective information integration within the supply chain can promote external supply chain information integration, which will, in turn, positively affect retailers' financial performance. Retailers should, when developing omni-channel retail strategies, focus on promoting internal supply chain information integration and the impact of internal information integration on external information integration. They can establish a comprehensive integrated information system that integrates data and shares information among various company departments; enable design system operations to connect information systems and exchange information with supply chain partners and design information confidentiality mechanisms that ensure information is securely communicated with supply chain partners.

5.2.2. Focus on Organization Integration within the Supply Chain

Effective organization integration within the supply chain can promote the integration of the external supply chain organization, which positively affects retailers' financial performance. Retailers should, when developing omni-channel retail strategies, pay attention to promoting internal supply chain organization integration and focus on the impact of internal organization integration on external organization integration. Organization integration plays a dominant role in overall supply chain integration, and retailers must pay more attention to it, as this will enable various departments within the company to connect and communicate with each other; actively encourage mutual cooperation among employees; encourage the establishment of cross-departmental teams for process improvement and facilitate regular meetings that organize inter-departmental communication among departments and strengthen their management capabilities. All of these changes will ultimately contribute to the improved efficiency of internal and external integration.

6. Conclusions

This paper draws on the literature to construct a model of the factors that influence omni-channel retailers' supply chain integration. It identifies seven variables: internal information, external information, internal process, external process, internal organization, external organization integration and financial performance. It then designs a theoretical framework by using the SEM model and constructs a model of the factors that influence omni-channel retailers' supply chain integration. This paper draws the following conclusions: in the case of retailers developing omni-channel retail strategies, internal supply chain information integration positively impacts external supply chain information integration; internal supply chain process integration positively impacts external supply chain process integration and internal supply chain organization integration positively impacts external supply chain organization integration. This is consistent with previous research that finds that any degree of internal supply chain integration positively influences external supply chain integration.

The study also finds that external supply chain information integration and external supply chain organization integration positively contribute to omni-channel retailers' financial performance. But external supply chain process integration does not positively affect retailers' financial performance, which may be due to the sample characteristics or the fact that retailers are in the early stage of developing the omni-channel retail strategy. This means they cannot totally negate the important role of external supply chain process integration in the development of an omni-channel retail strategy for Chinese retailers.

This paper makes theoretical and practical contributions in the following ways. First, by undertaking quantitative research that identifies the influencing factors that affect the supply chain integration of omni-channel retailers, this paper addresses an existing research gap in the field related to omni-channel retailing and supply chain integration. Second, the research findings of this paper offer instructive insights that will contribute to the development of omni-channel retailers in China and help them to achieve sustainable development under the new development pattern.

This paper also has a number of limitations. First, it only selects samples from the Chinese market, meaning that its findings are limited to this specific context. Second, retailers are still in the early stage of omni-channel retailing in China, with the descriptive statistics showing that the selected sample of retailers may currently not be succeeding in supply chain integration. Omni-channel retailers in the early stage of development tend to integrate information and organization and perform relatively poorly in process integration—the realization of process integration requires significant investment costs, meaning that process integration cannot play a positive role in promoting the financial performance of omni-channel retailers. As the omni-channel retail strategy gradually develops, retailers' supply chain integration will comprehensively improve in all aspects, and different conclusions may be obtained. This means that the article's conclusions could potentially only apply to retailers in the early stage of the development of the omni-channel retail strategy in China.

On this basis, we can perhaps offer some guidance to future research. First, researchers could take samples from multiple countries and obtain the impacts of different types of companies, institutional environments, market policies and government regulations on the research findings. Second, researchers could track the retailers and obtain a series of panel data. They could also study whether the implementation of the omni-channel retail strategy and supply chain integration produces positive effects over time, as this will, in turn, make it possible to provide guidance to retailers who are about to implement an omni-channel retail strategy.

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