Logistics Service Supply Chain

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In the logistics industry, there are great differences in the scope and depth of services that enterprises can provide. Functional logistics service providers are often able to provide one or more professional basic logistics services functions, such as packaging, warehousing, and distribution. However, basic logistics service capabilities are highly substitutable, and due to a lack of information and resource advantages, it is difficult to achieve a good supply and demand match. Logistics service integrators usually refer to large-scale enterprises with resource integration advantages that can integrate the service capabilities of multiple upstream providers. The logistics service supply chain consists of logistics service integrators and logistics service providers, among which the integrators can jointly establish a logistics network with the providers through business subcontracting.

logistics service supply chain smart logistics

1. Introduction

With the increase in customer demand for specialized and customized logistics services, many logistics enterprises began to change their service model from large-scale logistics services to large-scale customized logistics services [1]. In the environment of mass customized logistics services, to meet the customization demands of customers, increase scale benefits, and reduce uncertainties in the service process, many logistics enterprises spontaneously formed a logistics service supply chain (LSSC) through alliances and integration [2][3]. LSSC consists of functional logistics service providers (LSPs), logistics service integrators (LSIs), and customers [4]. With the continuous differentiation of the capabilities and advantages of each member in LSSC, logistic enterprises with resources and information advantages have gradually transformed into the role of LSIs, while enterprises specializing in basic logistics services have become functional LSPs [5].

Smart logistics is based on modern Internet information technology and realizes the systematic perception of warehousing, packaging, circulation processing, transportation, and distribution in the logistics industry through technology empowerment [5]. For logistics enterprises, the smart logistics development mode helps reshape the enterprise supply chain management and increase enterprise profits. Relevant studies have shown that companies that carry out smart logistics modes have a higher added value of products, higher operating efficiency, and shorter supply cycles, which have stronger advantages compared to traditional logistics modes [5][6].

As the core strategy of many logistics companies, smart transformation is no longer a multiple-choice question, but a survival issue [4]. In the process of smart transformation of the entire LSSC, LSI often takes the lead in encouraging LSPs to participate in this work [5]. Through smart transformation, LSI can reduce costs and improve

operational efficiency, while LSP can obtain more orders from LSI. For example, as an LSP of the Cainiao platform (the LSI), YTO Express provides customers with integrated warehousing and distribution services through the smart transformation of logistics service, such as introducing more advanced technologies and equipment, improving logistics service processes, and expanding logistics networks. As a result, YTO Express has obtained more orders from Cainiao.

However, for LSPs, participating in smart transformation is often a daunting task. First, smart transformation is a long-term process that cannot provide significant or immediate business benefits in a short period of time. Second, smart transformation typically requires significant capital investment. Therefore, LSP's smart transformation faces the uncertainty of investment and income, which seriously hinders LSP's enthusiasm for logistics service innovation [6].

2. Smart Logistics

The existing research on smart logistics is mainly discussed from three aspects. The first aspect is the operation level of smart logistics, emphasizing the application of smart technology, such as the application of big data technology [7]. The second aspect is the design level of the smart logistics system, emphasizing the overall improvement of the smart level [8][9]. The third aspect is the theoretical analysis of smart logistics, studying the current situation and future trends of smart logistics [10][11]. In general, smart logistics is a logistics system that uses smart technology and smart facilities to comprehensively perceive and identify all links of logistics and make decisions to optimize logistics services [12]. Kirch et al. [13] believed that smart logistics is the key means to developing cross-company or cross-industry transportation network logistics and information-based and efficient organization, and it is the inevitable trend of modern logistics development. Liu and Zhang [14] put forward the construction scheme of supply chain smart logistics mode based on logistics information service platform from the perspective of supply chain and provide a specific strategy of supply chain smart logistics mode transformation in combination with the actual situation of China's logistics industry. Liu et al. [15] used the social network analysis method to build a research framework to analyze the relationship between risk factors of smart logistics ecological chain. In addition, Liu et al. [6] used a case study approach and selected four cases to explore the factors affecting the implementation of circular supply chains in the smart logistics eco-chain. Pan et al. [16] studied the main factors affecting the construction of smart logistics in Chinese cities and whether carbon emission is the reason for the construction of smart logistics.

3. CS and RS Contracts

Scholars have extensively studied the supply chain collaboration problem, and most of the studies design supply chain contracts to solve the coordination problem. Typical contracts include CS and RS, etc. The CS contract motivates supply chain members to improve their innovation efforts by sharing costs to improve the quality of service. For example, Ghosh et al. [17] discussed the impact of CS contracts on key decisions of enterprises implementing green initiatives. Zhao et al. [18] confirm that the CS contract is an effective coordination mechanism

in LSSC. The RS contract is an effective supply chain coordination mechanism, which is first applied to the video rental industry [19]. At present, the RS contract has been applied to different industries such as e-commerce platforms [20][21], LSSC [22], product R & D [23]. In addition, some scholars have compared CS contracts and RS contracts. For example, Ma et al. [24] explored the impact of government subsidies and cooperation contracts on enterprises' green innovation efforts and benefits. The authors observed that, under the premise of government subsidies, the RS contract is more effective than the CS contract. Considering the reference emission and cost learning effects, Yu et al. [25] studied emission reduction and pricing strategies of the supply chain under the CS contract and RS contract. They observed that the manufacturer and the entire supply chain prefers CS contracts. Liu et al. [26] investigated which contracts are more effective in promoting enterprises to improve product greenness and increase revenue under different power structures. Liu et al. [27] construct a Stackelberg game model based on the mutual influence and restriction in the relationship between a manufacturer and an LSP. The authors explored whether CS and RS contracts can coordinate supply chains and proposed a CS-RS hybrid contract to achieve the perfect coordination of supply chains.

CS and RS contracts are widely used in supply chain co-innovation problems. However, currently, there is no research on LSSC to explore the incentive mechanism of contract for the smart transformation of LSP.

4. LSSC

The supporting role of the logistics industry in economic development has prompted many scholars to study LSSC. For example, Yunmiao et al. [28] studied the coordination problem of LSSC under uncertain demand. Liu et al. [29] explored the impact of different risk attitudes on the LSSC quality control game. Liu et al. [30] studied the impact of demand disruption on LSSC coordination. Considering the fairness concern behavior of LSI, Wang et al. [31] studied the coordination problem of LSSC. Liu et al. [6] investigated the impact of LSP's fairness concern behavior on LSI order allocation decisions. Liu et al. [32] studied the impact of CS contracts on key decisions of mass customization LSSC. Wang et al. [33] explored the impact of logistics enterprise risk preference on LSSC decision making in a fuzzy environment. Niu et al. [34] explored the role of IoT in building a traceable and sustainable LSSC.

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