

# ***Multi-Channel Supply Chains Considering Live Streaming Sales and Spillover Effects***

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**Abstract:** With the rapid development of e-commerce, an increasing number of companies, such as Huawei, Apple, and Adidas, are no longer confined to offline physical stores for product sales. They leverage third-party e-commerce platforms or establish online stores on their official websites. Modern consumers have access to various purchasing channels, including e-commerce platforms, offline stores, and manufacturer direct sales. In recent years, a new e-commerce model, live streaming sales, has emerged. In live streaming sales, professional salespersons or key opinion leaders (KOLs) showcase product performance, aiming to sell products online. Unlike traditional online channels, live streaming sales alleviate new consumers' uncertainty about product information through real-time interaction or comments from KOLs. Live streaming has been adopted by e-commerce giants worldwide, such as Taobao, JD.com, and Amazon, due to its significant sales revenue potential. Additionally, channels with KOLs may generate negative or positive spillover effects on other channels. These effects are crucial parameters for exploring the impact of seller profits in the multi-channel supply chain under live streaming conditions. Both domestic and international research have focused on live streaming sales, multi-channel sales, and spillover effects, with many studies yielding significant economic and social benefits. However, challenges faced by multi-channel supply chains, including complex channel management, difficulty in information synchronization, brand consistency issues, and increased costs, need to be addressed. To overcome these challenges, recommendations include integrating channel resources, optimizing channel experience, establishing cross-channel data analysis systems, strengthening supply chain coordination, continuous innovation and improvement, and strengthening brand building.

**Keywords:** Live streaming e-commerce, Multi-channel supply chain, KOL, Spillover effects

## **1. Introduction**

With the rapid development of e-commerce, an increasing number of companies, such as Huawei, Apple, and Adidas, are not only limited to offline physical stores to sell products. They utilize third-party e-commerce platforms (such as Taobao, JD.com, Amazon) or set up online stores on their official websites [1]. Modern consumers can purchase products through different channels including e-commerce platforms, offline physical stores, and manufacturer direct sales. In offline channels, offline retailers provide consumers with good shopping experiences; in e-commerce platform

channels, online retailers purchase goods from manufacturers and resell them to consumers [2]; in the online direct sales channel, manufacturers sell products directly to consumers through official websites. For example, the well-known Chinese home appliance manufacturer Haier operates offline physical stores and also supplies products on third-party e-commerce platforms (such as JD.com), while also selling products through its own Haier Mall (mall.Haier.com).

Meanwhile, a new type of e-commerce model has emerged in recent years—live streaming sales. In live streaming sales, sellers hire professional salespersons or key opinion leaders (KOLs) with many fans to showcase product performance from different perspectives through explanation and social interaction within a certain period, aiming to sell products online. Consumers can directly click on purchase links to buy products they like in the live stream [3]. Unlike traditional online channels, live streaming sales can alleviate new consumers' uncertainty about product information through real-time interaction or comments from KOLs or previous consumers. The display of products provides consumers with timely visual impact, enabling them to gain stronger sensory experiences and more confidence, thereby increasing sales conversion rates. Obviously, live streaming sales can help businesses promote products and encourage more consumers to make purchases. Moreover, live streaming has been adopted by most e-commerce giants worldwide, including Taobao, JD.com, and Amazon, as it brings in significant sales revenue[4]. Therefore, more and more businesses tend to collaborate with KOLs to boost their purchase rates.

Additionally, a channel with the help of KOLs may generate negative or positive spillover effects on the sales of other channels. Clearly, online channels with KOLs have negative spillover effects on the sales of other channels due to consumer conversion behavior. This is because if consumers purchase products through one channel, they will not purchase the same product from other channels in the short term. However, it also brings positive spillover effects on sales volume. For example, some consumers who are unable to purchase products in the live stream due to limited product quantity or live streaming time restrictions may purchase them through other channels. In this case, KOLs can have a positive impact on other channels, known as positive spillover effects, to increase sales volume. Therefore, consumer acceptance and cross-channel negative spillover effects and positive spillover effects are two key parameters for exploring the impact of seller profits in the multi-channel supply chain under live streaming conditions.

## 2. Literature Review

### 2.1. Live Streaming Sales

In recent years, with the popularity of live streaming sales, related research has attracted increasing attention from practitioners and experts. To our knowledge, most scholars mainly focus on customers' behaviors in live streaming business, including their purchase intentions and motivations. Specifically, Park et al. investigated the influence of different KOL matches on consumer attitudes in the context of live streaming sales in China[5]. Zhang et al. demonstrated that live streaming sales services can enhance trust and interaction between consumers and sellers, thereby stimulating sellers' sales volume[6]. Xiong et al. studied the relationship between anchor characteristics and balanced pricing, and the results showed that balanced live broadcast prices are positively correlated with anchor traffic effects and display effects[7]. Liu et al. divided the sources of online celebrity information into four dimensions: credibility, professionalism, interactivity, and attractiveness, and verified the impact of online celebrity information characteristics on consumer purchase intentions[8]. Zhao et al. summarized the characteristics of e-commerce anchors as interactivity, authenticity, professionalism, and popularity, and verified the promotion effect of anchor characteristics on consumer purchase intentions[9].

Additionally, there have been some recent studies on the supply chain of live streaming sales. For example, Pan et al. established a game model and found that opening a live streaming channel can increase profits when the KOL's ability is high[10]. They found that under certain conditions, the merchant live broadcast channel can replace the anchor live broadcast channel to increase the seller's profit. Zhang et al. also constructed two game models (merchant live broadcast and anchor live broadcast), demonstrating that the effective mode depends on the anchor's commission rate and fixed signing fee[11]. Yu et al. considered the impact of demand influenced by online celebrity live streaming on supply chain decisions when sellers dominate, online celebrity teams dominate, and both parties have equal rights[12]. Lin et al. studied a dual-channel supply chain composed of a single manufacturer, a single retailer, and a single celebrity anchor, and constructed game models considering both traditional marketing strategies and live marketing strategies[13].

## 2.2. Multi-Channel Supply Chains

Multi-channel supply chain (MCSC) is also a hot topic in current research. In related studies, Sarkar et al. constructed an MCSC model with traditional channels and direct sales channels, focusing on market strategy and optimal supply chain decisions from the perspective of manufacturer service provision[14]. The model developed by Zhen et al. considers market shares of different channels and discusses MCSC decision issues from four fairness dimensions[15]. Matsui compared the timing of pricing decisions in MCSC and drew conclusions about the different decision timing for manufacturers and retailers[16].

Wang Ruifeng et al., using a single-channel supply chain as a benchmark, explored changes in sales pricing decisions, changes in manufacturer market control, and changes in respective profits after both manufacturers and retailers introduced online channels[17]. Zhang Xin et al. studied the optimal decision problem among different sales channels and further analyzed the influence of internet celebrity live broadcast channel share, internet celebrity live broadcast room diversion coefficient, and commission ratio on equilibrium solutions[18]. Xu Jinping et al. considered consumer channel preferences, studying optimal pricing and profits for retailers under dual-channel, showroom, and buy online, pick up in-store (BOPS) modes, and through comparative analysis, clarified how retailers should choose the optimal retail mode based on the level of consumer channel preference[19]. Ma Deqing et al., in the context of multi-channel retailing, discussed the phenomenon of reverse showrooming, where consumers switch to offline channels to make purchases after gathering product information online, and its impact on the selection of optimal sales models for platforms consisting of one manufacturer, one platform-type retailer, and one physical retailer[20]. Liu Yizhi et al., based on the SOR theory model perspective, constructed a model of consumers' online channel migration willingness in a multi-channel retail environment, exploring the mechanisms of action between external stimulus factors, consumer intrinsic experience factors, and online channel migration willingness[21]. Liang Xi et al. studied how to maximize the interests of all parties and the overall benefits in a multi-channel supply chain system[22].

## 2.3. Spillover Effects

Some researchers focus on channel competition under spillover effects. For instance, Xia et al. designed a new model describing how supplier encroachment affects retailer and system performance under positive service spillovers and different channel powers[23]. They found that retailers can benefit from manufacturer encroachment when the service spillover effect is strong. Wu et al. considered positive brand spillover effects in cooperative supply chains. They found that brand spillover can motivate manufacturers to establish direct sales channels[24]. Wang Tao et al. considered the reality of limited audience reach for manufacturers' self-built channels and introduced

the spillover effect of e-commerce platforms improving the audience reach of manufacturers' self-built channels into an online channel model composed of one manufacturer and one e-commerce platform, analyzing the optimal decision problems when the manufacturer does not enter the e-commerce platform and when it enters, respectively retaining and relinquishing its self-built channels[25]. Li Xidong et al. argued that offline channel service has a positive spillover effect on online channels[26].

Meanwhile, an increasing number of papers focus on both positive and negative spillover effects. For example, Abhishek et al. considered the impact of positive and negative demand spillovers based on a dual-channel structure on the sales format of online channels[27]. Their research showed that when online channel sales negatively affect offline channel demand, online retailers tend to adopt agency sales; otherwise, reselling mode is the optimal choice. Zhen et al. discussed the interaction between online and offline channels and established a game model with demand spillovers in a multi-channel structure[28]. In this model, they explained the impact of demand spillover effects in two directions, either from offline channels to online channels or from online channels to offline channels.

### **3. Advantages and Challenges**

#### **3.1. Advantages of Multi-Channel Blockchain Considering Spillover Utility and Live Sales**

**Increased Sales Opportunities:** Combining multi-channel supply chains with spillover utility and live sales can increase sales opportunities. By providing various purchasing channels such as physical stores, online platforms, and social media live broadcasts, consumers may purchase related products through other channels after buying from one channel, thereby increasing sales opportunities.

**Enhanced Consumer Experience:** Live sales can provide a richer and more vivid shopping experience by demonstrating products through live broadcasts, answering consumer questions, etc., enhancing consumer purchase decision confidence, satisfaction, and loyalty.

**Optimized Market Coverage:** Multi-channel supply chains can optimize market coverage to meet the purchasing habits and preferences of different consumers. Some consumers prefer offline shopping, while others lean towards online or live shopping, and a multi-channel supply chain can better meet these diverse needs.

**Increased Brand Exposure:** Through multi-channel sales, companies can increase brand exposure. Consumers encounter the brand through different channels, increasing brand awareness and influence.

#### **3.2. Challenges Faced by Multi-Channel Supply Chains Considering Spillover Utility and Live Sales**

**Complex Channel Management:** Multi-channel supply chains increase the complexity of channel management. Different channels may require different marketing strategies, inventory management, and supply chain management, requiring companies to invest more resources and effort into management.

**Difficulty in Information Synchronization:** Information systems of different channels may be incompatible, leading to difficulty in information synchronization. For example, there may be delays or inaccuracies in synchronizing inventory information, order information, etc., between different channels, affecting decision-making and operational efficiency.

**Brand Consistency Challenge:** Maintaining brand consistency is a challenge in multi-channel sales. Different channels may have differentiated brand positioning and images, and companies need to ensure consistent brand communication and expression across all channels.

**Increased Costs:** Multi-channel supply chains may increase company costs. For example, more resources are needed to manage multiple channels, provide equipment and personnel for live sales, etc., all of which increase operational costs.

## 4. Development Recommendations

**Integrate Channel Resources:** Integrate resources from different channels to achieve cross-channel cooperation and sharing, enhancing spillover utility. For example, attract consumers to physical stores through online live sales, or promote online live sales activities to consumers in offline stores.

**Optimize Channel Experience:** Focus on improving consumer shopping experiences across all channels. In live sales, enhance consumer purchase decision confidence through high-quality live content and interaction; in physical stores and online platforms, provide convenient shopping environments and personalized services to enhance consumer satisfaction.

**Establish Cross-Channel Data Analysis Systems:** Establish cross-channel data analysis systems to monitor sales data and consumer behavior across different channels in real-time, enabling timely adjustments to marketing strategies and supply chain management. Through data analysis, gain insight into consumer needs and preferences to support product development, marketing activities, and channel management effectively.

**Strengthen Supply Chain Coordination:** Strengthen coordination between various links in the supply chain to ensure timely responses to the needs of different channels. Establish close cooperation with suppliers, logistics partners, etc., to jointly optimize supply chain processes and improve flexibility and efficiency.

**Continuous Innovation and Improvement:** Multi-channel supply chains are dynamic systems that require continuous innovation and improvement. Pay attention to changes in industry trends and consumer demands, adjust business models and strategies promptly to maintain a competitive advantage and increase market share.

**Strengthen Brand Building:** In multi-channel sales, brand image and reputation are crucial. Strengthen brand building to enhance brand awareness and reputation, attract more consumers, and increase consumer loyalty.

## 5. Conclusion

The article examines e-commerce's growth, highlighting live streaming sales and multi-channel supply chains. It notes companies like Huawei and Apple expanding beyond physical stores to e-commerce platforms and official websites. Live streaming sales offer real-time interaction, enhancing consumer confidence and sales conversion. Channels with Key Opinion Leaders (KOLs) may impact other channels positively or negatively. Development recommendations include integrating channel resources, optimizing experiences, establishing cross-channel data analysis, strengthening supply chain coordination, continuous innovation, and brand building.

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