



## Review Dual-channel supply chain pricing and coordination

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### Abstract:

*This paper synthesizes multi-channel supply chain-related research from leading management journals and enlightens the current researcher, states of the research and projecting of where it is heading. Our review involves a strategic finding of the dual/multi-channel pricing decision and coordination. This article contributes to the literature in two ways: (a) by reviewing the most impactful literature on SCM that is directly related to the Pricing and Channel coordination, (b) by summarizing the theory and findings in SCM and Retailing literature.*

**Keywords: Dual/Multi-channel, Pricing, Channel coordination**

### 1. Introduction

Supply chain management (SCM) is an integral part of the current business paradigm. The holistic approach makes it more valuable than before. It is a system that can oversee the business process from the beginning to end more specifically, raw materials collection to final product delivery to customers (Ganeshan, 1995). SCM is an emerging term that accentuates interactions among marketing, logistics, production, and procurement. Its application brings opportunities associated primarily with managing the logistics channel across the legal limitations of enterprises, such as between companies and their suppliers. Supply chain management has transformed the business from an intra-functional vision of the channel toward an inter-functional and even inter-organizational one (Karuna, Lokesh, & Vivek, 2006).

The last couple of decades SCM have become more prominent, and industry managers keep asking the researchers to innovate better idea and process to

maximize the profit so that they can satisfy their customers demand. Fortune 500 companies like Amazon, Apple, Wal-Mart, Coca-Cola, Intel, Nike, P&G and Starbucks, supply chain management attributed a considerable amount of success (Kozlenkovaa, Hult, Lund, Mena, & Kekec, 2015). An industry survey shows that companies those implementing supply chain strategies are earning very high than those are not implementing. The financial growth is overwhelming especially in Consumer products and Telecommunications sector (PwC, 2013). The efficient supply chain system is the most crucial part of the business. (Ellis, 2011) has given very well explanation for it. He says "When firms make mistakes anywhere within at the supply chain, the effects can ripple through the chain in both directions. These effects include disruption to production, forecasting errors, inventory imbalances, stock-outs or damaged goods, all of which usually result in increased costs that may have to be passed on to end users, thus reducing their satisfaction and loyalty". However, an



efficacious supply chain offers to improve performance outcome and increased value to the end consumers (Kozlenkova, Hult, Lund, Mena, & Kecec, 2015).

Over the years, numerous amount of research has done in SCM and still going on. Though supply chain itself is massive, this paper we mainly focus on the marketing channel precisely Dual channel or Multi-channel. Marketing channels typically consist of three major entities: manufacturers, intermediaries (i.e., distributors, wholesalers, retailers), and end-users (individual consumers or business customers). As such, marketing channels span various events from the point of product or service manufacture to its final consumption (Palmatier, W., Louis, Adel, & Erin, 2014). The distribution channel plays a very vital role in supply chain management. At the beginning of the SCM era, manufacturers produce the products and send to retailers then customers visit retail stores to buy the product as per as their requirement. This particular distribution system called Traditional Channel that still exists in business. However, after the inception of internet technology, there have been so many changes happened and revolutionized the distribution system (Clemons, 2003). There is multiple channel system emerged, and manufacturers can merchandise their products using a various retail channel that increases sales volume and profit margin. It allows manufacturers to collect and store information about customers, understand their individual choices, and more importantly, produce products that are exclusively customized to meet their preferences (Raaid, Mohamad, & Simone, 2016). (Mangalindan, 2005) found that customers are more likely to buy specific products via the direct channel. The observations also suggest that difference in product/cost characteristics of the two channels, as well as consumer preference for different channels, deeply influence the performance of supply chains. A recent forecast report for U.S. cross-channel sales for the period 2012 to 2017 predicted that by 2017, sixty percent of all U.S. retail sales would involve online sales, this either as direct e-commerce or as an element of shoppers' research on a laptop or mobile device (Chen, 2015). However, there is another scenario arises as well; a new channel strategy brings disbelief between manufacturers and retailers that cause channel conflict (Tsay, 2004). Once, a business partner now becomes a competitor, business harmony hampered seriously (Chen, 2015). To avoid rivalry with their retailer partners, manufacturers, such as Levi Strauss & Co., Daimler-

Chrysler, Nikon, and Rubbermaid, have decided not to sell products from their website. Instead, they offer information on the nearest seller carrying their merchandises. Researchers are trying hard to mitigate this confliction by better channel coordination strategy as well as fair pricing policy, which will benefit all the parties involved in the business. Our goal is to study previous research of pricing mechanism and channel coordination in Dual/Multichannel SCM. This paper contributes to the literature in two ways: (1) by reviewing the breadth of the most impactful literature on SCM that is directly connected to the Pricing and Channel coordination, (2) by summarizing the theory and findings in SCM and Retailing literature. This literature review will help us to understand past research and guide us to future research scope.

The paper is structured as follows. Section two contains an overview on the Dual channel. Sections three: Pricing strategy. Section four: Channel coordination. Section five: Conclusion with future research scope.

## 2. Dual Channel

Dual channel is distribution systems that facilitate manufacturers to sell their products to customers by using both traditional retail channel and online channel/multi-channel (Chiang, 2005) (Khouja, 2010). It allows manufacturers to interact directly with customers to offer their products and services without any intermediaries that ensure higher profit margin and minimize cost (Cattani, 2006) (Se-Hak Chun, 2011). (Rangaswamy & Van Bruggen, 2005) define dual/multi-channel is the practice of communication that offers consumer's goods and services via two or more coordinated channels. The objective of multi-channel is to efficiently manage the customer relationships according to customers' channel preferences. (Kushwaha & Shankar, 2013) identified the channels that include brick-and-mortar retail operations, direct mail, phone or digital channels including e-commerce and mobile devices. The information flow between manufacturer and customer helps to develop a new product, forecasting demand and managing inventories (Mukhopadhyay, 2008). (Tsay, 2004) their research shows, both the manufacturer and retailer can be benefited by adopting a dual-channel supply chain. Researchers found dual channel strategy not only out-perform other channel system but also minimize the effect of double marginalization (Chiang W. , 2003) (Chiang W.-Y. G., 2005). Figure 1 depicts the dual-channel structure.

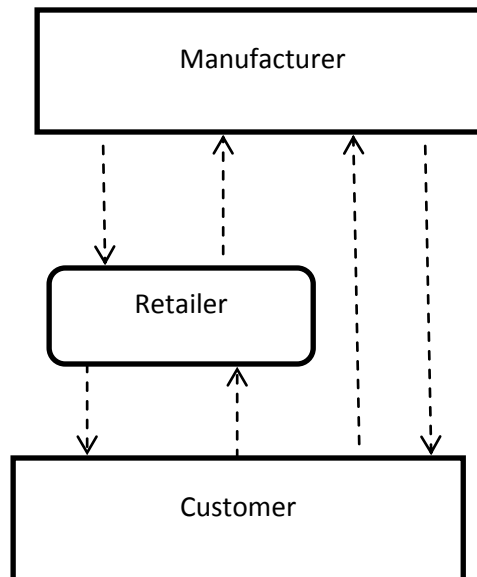


Figure 1: Dual Channel

Introduction of dual channel in business not only attracted to the manufacturers but also got attention from the research community as well. An extensive amount of research has been done and still going on. Dynamic nature of the business and fierce competition demanding more study and scholars admitted that. Pricing strategy and channel coordination are two main interested area of research among the researchers.

### 3. Pricing Strategy

Pricing decision is strategic and important in any business scenario; it is the main measure and strategy to compete with other opponents. The pricing strategy for the dual/multi-channel in the supply chain has been considered quite broadly. A maximum number of the published research on the subject discussed the scenario of a single product sold in two different channels, to be precise, traditional brick-and-mortar retail stores and a manufacturer's direct Internet channel. Running multiple channels in business became standard practice. Retailers used to resist the new channel initiative to fear of business cannibalization, now realized and accept the fact that it is not the same as they thought. Customers are habituated to buy products from both types of channels; the study found that customer loyalty has a significant influence on pricing decisions.

Research has shown that retail service strongly affects the pricing and profits strategies. In fact, the dual channel brought new perception in business development and pricing. (Webb, 1997) Pricing is the major issue on

which the most channel conflict is caused, and price erosion on the internet is a big concern. Constant pricing policies that optimize profits for the manufacturer are desired by the retailer and customers. Scholars proposed many pricing strategies that can help manufacturer and retailer to increase their sales and maximize the profit. (Wei Huang, 2009) the study shows new channel brings in more customers to the market and it has a significant cost advantage. (Webb K. L., 2002) has given a proposition about dual channel pricing "Supplier firms will experience lower levels of channel conflict by not pricing products on their website below the resale price of their channel partners." (Cattani, 2006) found consumer's shopping preference entices manufactures to adopt multi-channel supply chain so do pricing. (Gila E. Fruchter, 2005) study revealed that customer's heterogeneity on online shopping acceptance affects manufacturers pricing strategies. (Song Huang, 2012) study showed that consumer's choice and market scale change greatly motivate optimal pricing decision. Demand and production activity also influenced the dual channel pricing strategy. The study shows disruption plays an important role in optimal pricing. (Run H, Xuan, Ignacio, & Tarja, 2012) found in a dual-channel retailer supply chain, pricing of the product in one channel will affect the demand in the other channel. The member's pricing decisions interact with its inventory/production decisions, and similarly, the supplier's decisions interact with the retailer's decisions.



Wholesale price also plays a significant role in pricing strategy; study shows competitor’s with little market share usually take the market penetration pricing strategy. They come into the market with a competitive product's price to

make their product's market growth acceleration and sacrifice higher gross margin to acquire higher sales and market share. To expedite the literature review, we provide detailed summaries of highly cited articles in Table 1.

**Table 1: Dual/Multi-Channel Pricing**

| Reference                      | Research focus  | Main theories  | Findings/Implication   |
|--------------------------------|---|--|--|
| (Chiang W. , 2003)             | Dual-channel supply chain design  | Competitive Strategy and Game Theory                         | Retailers will be benefited if manufacturers adopt online channel with reduced wholesale price and manufacturer can improve overall profitability by reducing the degree of inefficient price double marginalization   |
| (Gila E. Fruchter, 2005)       | Dual channels with heterogeneous market   | Dynamic hierarchical game-theoretic problem                  | The manufacturer should adopt a non-discriminating pricing policy and charges the same price across both channels.   |
| (Cattani, 2006)                | Pricing and Channel conflict  | Game theory  | Specific equal-pricing strategy optimizes the profits for the manufacturer. The retailer and customers are more often prefer this strategy.  |
| (Hisashi Kurata, 2007)         | Channel pricing in multiple distribution channels   | Brand Management, Nash equilibrium                           | Brand loyalty building is profitable for both an NB and an SB. Marketing decisions are more restrictive for an NB channel than they are for the SB channel.  |
| (Aussadavut Dumrongsiri, 2008) | Pricing and quantity decisions  | Game theory and Nash equilibrium                             | Demand variability and marginal cost have a major influence on equilibrium pricing in dual channel. They also found that retailer’s service quality may impact on manufacturer’s profitability.  |
| (Gangshu Cai, 2009)            | Price discount contracts and pricing Schemes in the dual-channel supply chain competition | Nash equilibrium and Stackelberg games                       | Price discount contracts can perform better than non-contract scenarios, and consistent pricing scheme can minimize the channel conflict with retailers.   |
| (Xiao, Dan, & Zhang, 2010)     | Service cooperation pricing strategy  | Stackelberg and Bertrand models                              | Manufacturers and retailers' marginal service cost in electronic channels has a great effect on the channels' demand and pricing decision. Manufacturers' service cost in electronic channels is positively associated with the retails channels' pricing                          |
| (Liu, Zhang, & Xiao, 2010)     | Production and pricing under information asymmetry  | Price-dependent stochastic demand and asymmetric information | If the uncertainty in the traditional channel information is higher, the manufacturer may design a menu of contracts to cope with different channel setting and to obtain more expected profit. When uncertainty in the traditional channel is lower, the manufacturer may adopt a |



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|                                       |   |   | single contract rather than a menu of contracts.   |
| (Guowei, Shouyang, & T.C.E, 2010)     | Price and lead time decisions dual-channel supply chain                               | Two-stage optimization and Stackelberg game | Delivery lead time strongly influences the Manufacturer's and retailer's pricing strategies  |
| (Huang, Yang, & Zhang, 2011)          | Pricing decision and cooperative advertising strategy on dual-channel supply chain    | Stackelberg game                            | The manufacturers' and the retailers' pricing decisions were largely influenced by advertising investment.   |
| (Xu, Gou, Zhou, & Liang, 2010)        | Pricing decisions in a two-echelon dual-channel supply chain                          | Game theory                                 | The direct channel can extend the manufacturer's market, satisfying more customers' demand besides the retailer's market segment.  |
| (Bin Dan, 2012)                       | Price decisions in a centralized and a decentralized dual-channel supply chain        | Two-stage optimization and Stackelberg game | Retail services strongly influence the manufacturer and retailer's pricing strategies  |
| (Yu-Chuang & Po-Yuan, 2012)           | Optimal price and warranty length for a product.                                      | Non-cooperative and cooperative equilibrium | The manufacturer and the retailer earn more profit in the cooperative game than the non-cooperative game.  |
| (He, Zhen Zhen, & Sheng Hao, 2012)    | Price and delivery lead time  | Game theory                                 | The choice of channel structure depends on customer acceptance of the online channel and the cost parameters.  |
| (Run H, Xuan, Ignacio, & Tarja, 2012) | Joint pricing and inventory/production decision                                       | EOQ and Stackelberg game                    | Pricing for different product categories for the online store and the offline store must be done strategically.  |
| (Song Huang, 2012)                    | How to adjust the prices and the production plan                                      | Disruption management and Game theory       | Optimal pricing decisions are affected by customers' preference for the direct channel and the market scale change.  |
| (Lidan, Rong, Sandang, & Bin, 2012)   | Dominance strategies for maintaining its dominant position                            | Stackelberg game                            | The dominant manufacturer can necessarily benefit from the wholesale price dominance strategy.   |
| (Rong, Bin, & Wenliang, 2012)         | Pricing decisions under different power structures of a dual exclusive channel system | Game Theory and equilibrium                 | No power structure is always the best for the entire supply chain, though all members on supply chain have the incentive to lead the Stackelberg game.   |
| (Qihui & Nan, 2013)                   | Pricing modes for a supplier  | Game theory                                 | Channel acceptance plays a critical role in influencing equilibrium prices and profits in the dual-channel distribution system   |
| (Yun Chu Chen, 2013)                  | Pricing policies  | Nash and Stackelberg games                  | Successful brand loyalty brings profit to both the manufacturer and retailer. It also shows that an increased service value alleviate the threat of the online channel for the retailer and increase the manufacturer's profit |
| (Jennifer K, Daewon, & Xuying, 2013)  | Dual channel competition  | Game Theory and newsvendor                  | If the retail channel has a more significant market share than the online channel, in  |



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|   |   | problem   | such a scenario, the manufacturer may maintain price discrimination, selling the products in different channels at different prices.  |
| (Song, Chao, & Hui, 2013)               | Pricing and production problem in a dual-channel supply chain |   | In the centralized dual-channel supply chain, the manufacturer is always in a better position to respond timely and utilize the revised strategy.<br>In the decentralized dual-channel supply chain, they proposed a threshold. If customers' preference is below to the threshold level indirect channel, then the optimal direct sale price equals to the wholesale price; otherwise, the optimal direct sale price and wholesale price equals to the optimal direct sale price and retail price in the centralized dual-channel supply chain |
| (Tsung-Hui, 2015)                       | The impact of price schemes and cooperative advertising       | Manufacturer Stackelberg game theoretic framework | Market sizes of both brand loyal and store loyal consumers are sensitive to the retail and online price. Retailer's local advertising and manufacturer's investment in a national brand name can effectively extend the market shares and create higher profit.   |
| (Panda, Modak, Sana, & Basu, 2015)      | Pricing and replenishment policies                            | Stackelberg game and profit sharing               | The manufacturer must determine a planning horizon shorter than the lifetime of the product.<br>The product compatibility has a significant impact on the successful operation of the profitable retail online channel.   |
| (Betzabé & Göker, 2015)                 | Pricing and assortment decisions in supply chain              | Nested-logit model and Assortment planning        | The wholesale price net of unit production and inventory costs, weighted by the item's safety stock factor, must be the same across all items.  |
| (Xiao & Jim (Junmin), 2016)             | The pricing and channel priority strategies                   | Game Theory                                       | Pricing and channel priority strategies remain robust to the time sequence of channel priority decision.  |
| (Qing, Ciwei, & Zhicong, 2016)          | Hierarchical pricing decision process                         | Operational strategy and Stackelberg game         | Equal-pricing strategy and price-matching strategy may not always be optimal for the manufacturer. The price of the direct channel can be higher than the wholesale price.  |
| (Bo, Mengyan, Yushan, & Zhenhong, 2016) | Pricing and greening strategies for the chain members         | Stackelberg game                                  | The degree of customer loyalty to the retail channel, the greening cost, and the greening sensitivity significantly affect the greening pricing strategies of chain   |



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|   |   |   | members.<br>The retail price in the centralized dual channel green supply chain is higher than that in the decentralized dual-channel green supply chain, which contrasts with the result of ‘double marginalization.’   |
| (Lingcheng Kong, 2017)                        | Dual-channel operations of the closed-loop supply chain (CLSC).                   | Revenue sharing, Pareto optimization, and linear demand function. | There is a positive correlation between optimal price and service level in a centralized supply chain model, and the relationship relies on the relative value of increased service cost.  |
| (Jingxian, Liang, Yao, & Sun, 2017)           | Price and quality decisions   | Pareto zone and Game Theory                                       | Adding a new channel brings profit for supply chain players and consumer surplus can be improved. Manufacturer’s quality improvement can help to mitigate channel conflict when the market is more sensitive about product quality                               |
| (Lisha, Huaming, & Yongzhao, 2017)            | Pricing and service decisions   | Bertrand and Stackelberg  | The direct online channel activities can bring about a slight increase in profit in inconsistent pricing decision, but it may lead to channel conflict and decrease retail channel demand.   |
| (Jing, Xiaorui, Yunlian, & Jie, 2017)         | Pricing problem of complementary products   | Game Theory. Nash game model                                      | Consumer brand loyalty, consumer channel loyalty, product complementary level and the market power structures significantly affects the pricing strategies.  |
| (Giri, Chakraborty, & Maiti, 2017)            | Closed-loop supply chain  | Game Theory   | The manufacturer-led chain is the best from the whole system’s perspective as well as the manufacturer’s perspective. The retailer-led channel is the best amongst all the decentralized scenarios.  |
| (Shu-San, I. Nyoman, Suparno, & Basuki, 2017) | Pricing decisions for new and differentiated remanufactured products in a CLSC    | Stackelberg game, Closed loop supply chain                        | Consumer’s acceptance and preference influence both the pricing decisions and profits of supply-chain members.   |
| (Kenji, 2017)                                 | Timing problem  | Game Theory   | The manufacturer should announce the direct price before setting the wholesale price for the retailer.<br>This price announcement helps to establish the perfect Nash equilibrium of the non-cooperative game between channel members and maximizes the profits. |
| (Yong-Wu Zhou, 2018)                          | Pricing/service strategies in differential and non-differential pricing scenarios | Service-cost sharing contract, Service level, and free riding     | In the differential scenario, service-cost sharing contract may evade price competition between two channels. The non-differential scenario is better suited for the retailer than the manufacturer.   |



**4. Channel coordination**

Introducing the dual-channel system in the business, the manufacturer has to redefine his/her relationship with the downstream retailer. The most significant obstacle to building successful multi-channel strategies is the emergence of conflict between the different channel users for reaching customers (Bert, 2007) (Giri, Chakraborty, & Maiti, 2017). In the age of e-commerce, the success of dual-channel is depended on mitigating channel conflict and better channel coordination. Channel conflict between channel members tends to be a very adverse force which causes lower profits for all parties. It is crucial to mitigate the channel conflict and improve channel coordination to ensure the benefit of both the manufacturer and the retailer.

It is quite understandable that the existence of channel conflict between the indirect channel and the direct channel because both channels compete for customers. Since the manufacturer plays a significant role in decision making, they must prudently avoid channel conflict and make a careful trade-off between product variety and customization (Tiaojun Xiao, 2014) (Laudon, 2002).

The firms realize that profits can be enhanced more effectively through greater cooperation and better coordination across the entire supply chain. If the benefits of coordination and cooperation accrue to all parties, the coalition will likely to remain, and the benefits will continue to accrue. However, if cooperation results in one of the parties benefiting at the expense of the others, the coalition will likely to falter. The members of the supply chain system are partners, and they are expected to coordinate and co-operate in their activities so that their relationship is further strengthened.

Over the years Dual /Multichannel caught attention from the researchers around the world. Business model and theories were proposed to ease retailers’ concerns and

improve multichannel supply chain performance. Both the academy and industry, it has been a topic of interest. The study shows that coordination among the channel members is essential and major players have the proficiency to realize that the benefits of the members of the chain. Several contracts are designed adequately and implemented among the decision makers such a way that the difference between the outcome of a centralized decision and decentralized decisions can be neutralized. That helps to coordinate the members of a supply chain. The main objective behind designing a coordination contract is to incentivize decentralized channel members to act coherently with one another.

The researcher found that the inventory and warehouse sharing model can be the right way to mitigate conflict and established good cooperation among major partners in the business. In dual channel inventory model, inventory is kept at a warehouse at retailer locations. Both manufacturer and retailer use this inventory to satisfy their respective customer in the traditional channel and direct channel sales. Because consumer’s preference is heterogeneous, some prefer retail stores and others prefer the direct channel. The study also reveals that a well-coordinated dual channel strategy outperforms single-channel strategies in most cases.

A revenue-sharing contract is another way to mitigate the channel conflict between upstream and downstream entities of the supply chain when the channel leader operates a direct online channel. In this contract, the channel leader to allocate the profit split to the channel followers, and to entice the channel followers to accept a direct online channel model. We have reviewed the most cited articles from different business journals and summarized the findings. Table 2 provides the summary of previous research findings. It will enlighten the future researcher and give them a better understanding of the research topics.

**Table 2: Dual/Multi-Channel Coordination**

| Reference                 | Research focus  | Main theories           | Findings/Implication   |
|---------------------------|---|-------------------------|--|
| (Andy A & Narendra, 2004) | The dynamics of channel conflict by modeling a stylized supply chain. | Game theory             | Revisiting the wholesale pricing terms can improve the overall efficiency of a dual-channel system by paying the reseller a commission for diverting customers toward the direct channel, or conceding the demand fulfillment function entirely to the reseller. |
| (Boyaci, 2005)            | Coordination mechanisms in the multiple-channel                       | Compensation-commission | It is essential for manufacturers and retailers to engage in creative revenue sharing agreements   |





|                                      | distribution system.   | contract  | that align the incentives of each party with that of the entire supply chain.   |
|--------------------------------------|--|---|---|
| (Ralf W, Ulrich W, & Marcel A, 2006) | Coordinating supply contracts  | Inventory subsidy and excess retail stock.        | Supply-chain integration results in the substantial channel- stock reductions and reductions in lost sales that translate into significant profit gains for the entire supply chain.  |
| (Hisashi Kurata, 2007)               | Channel pricing in multiple distribution.                                      | Brand Management, Nash equilibrium                | Wholesale price change does not coordinate the supply chain. An appropriate combination of markup and markdown prices can achieve both supply chain coordination and a win-win outcome for each channel.  |
| (Lau, Lau, & Wang, 2008)             | Dominant retailer's purchase contract for supply chain coordination            | Purchase contract and new vendor contract         | The purchase contracts are designed to coordinate supply chains when considering price-sensitive demand, thus allowing the dominant retailer to generate higher profit  |
| (Yao, Leung, & Lai, 2008)            | Investigate the channel coordination performance                               | Stackelberg game                                  | A revenue-sharing contract can coordinate a decentralized channel with some conditions better than price-only contracts. To improve the Channel coordination, the manufacturer should increase the retailer's ratio of shared revenues.                         |
| (Ruiliang, 2008)                     | Channel coordination and profit improvement                                    | Nash bargaining model                             | Both the manufacturer and the retailer will be better off by adopting a profit-sharing policy in a dual-channel market.   |
| (Aussadavut Dumrongsiri, 2008)       | Dual channel performance in equilibrium  | Game Theory                                       | Larger range of service sensitivity may benefit both retailers and manufacturers.   |
| (Gangshu, 2010)                      | The influence of channel structures and channel coordination                   | Pareto zone                                       | The supplier and the retailer can benefit from using a designed contract. The profits of the supplier and the retailer in the coordinated scenarios depend on the revenue sharing rate.   |
| (Ruiliang Y. , 2011)                 | Channel coordination and supply chain performance                              | Nash bargaining model and differentiated branding | Differentiated branding effectively alleviates channel competition and conflict but not full coordination. Full channel coordination and increased profits for the supply chain players can be achieved and maintained through a profit-sharing mechanism.      |
| (He & Zhao, 2012)                    | Coordination in multi-echelon supply chain under supply and demand uncertainty | Return policy                                     | A properly designed returns policy between the manufacturer and the retailer, combined with a wholesale-price contract between the raw-material supplier and the manufacturer can efficiently coordinate the entire supply chain and achieve a win-win outcome. |
| (Jing, Hui, & Ying, 2012)            | Coordination contracts in a dual-channel supply chain                          | Supply chain coordination and Stackelberg game    | The retailer's profit share is in a given range, can coordinate the dual-channel supply chain and allow both the retailer and the manufacturer to be a win-win.   |
| (Xu & Liu, 2012)                     | Coordination model based on seasonal compensation                              | Cooperative transshipment                         | The cooperative transshipment strategy help to increase the order quantity and minimize the risk.   |



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|   |  |  | The residual stock transfer can mitigate the risk of a direct channel.  |
| (Ryan, Sun, & Zhao, 2013)               | Supply chain coordination  | A modified revenue-sharing contract and gain/loss sharing contract | Coordination is most critical for products which are highly priced sensitive and for systems in which the online and traditional retail channels are not viewed as close substitutes.   |
| (Ma, Wang, & Shang, 2013)               | Contract design for two-stage supply chain coordination                  | Game theory and two-part tariff                                    | Using the traditional two-part tariff contract alone cannot coordinate the supply chain well. An innovative supply chain contract needed that integrates the endeavors of the manufacturer and the retailer.  |
| (Chen L.-T. , 2013)                     | Supply chain coordination under consignment and vendor-managed inventory | Game theory and Vendor-managed inventory                           | Consigned revenue-sharing VMI contract tends to achieve lower retail prices, larger stock quantity, improved channel efficiency and increased overall channel profits.  |
| (Guangye, Bin, Xumei, & Can, 2014)      | The impact of a dual-channel supply chain coordinating contract          | Revenue sharing and Risk averse                                    | The price set by a risk-averse dual-channel supply chain is lower than the one set by a risk-neutral dual-channel supply chain. Two-way revenue sharing contract can coordinate the dual-channel supply chain and ensures the supply chain members can achieve a win-win situation. |
| (Panda, Modak, Sana, & Basu, 2015)      | Pricing and replenishment policies in a dual-channel supply chain        | Stackelberg game and profit sharing                                | A profit sharing mechanism through wholesale price adjustment resolves channel conflict   |
| (Tsung-Hui, 2015)                       | The channel coordination challenge entities of the supply chain          | Revenue sharing  | Compensate the disadvantaged partner and eliminate the channel Conflict. The channel leader can mitigate the channel conflict by setting a direct online price that matches the retailer's price in the traditional channel, granting the retailer a wholesale price reduction.     |
| (Xiao & Jim (Junmin), 2016)             | The impacts of channel coordination and the time sequence of decision    | Game theory  | Coordination of the dual-channel supply chain can alleviate the retailer's complaint of insufficient supply.  |
| (Qing-Hua & Bo, 2016)                   | Dual-channel supply chain equilibrium problems.                          | Stackelberg game and Value-added service                           | The entire supply chain cannot be coordinated with a constant wholesale price when the retailer provides value-added services and has fairness concerns.  |
| (Bo, Mengyan, Yushan, & Zhenhong, 2016) | Coordinating the dual-channel green supply chain                         | Two-part tariff contract   | The two-part tariff contract can coordinate the dual-channel green supply chain and enable the manufacturer, the retailer and the environment all to be winners.  |
| (Bo, Peng-Wen, Ping, & Qing-Hua, 2016)  | Coordinating the dual-channel supply chain                               | Risk-sharing contract  | Using only the wholesale price contract or the traditional revenue share contract could not coordinate the supply chain. The improved risk-sharing contract can coordinate the dual-channel supply chain, even though the prices in the two channels are not consistent.            |
| (JiaPing, Ling, LuHao,                  | Contract coordination of   | Revenue sharing  | The manufacturer may adopt two-way revenue  |



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| & Petros, 2017)                                   | centralized and decentralized dual-channel closed-loop supply chains  |   | sharing contract to simulate retailer. The share ratio of reverse revenue sharing affects advertising level and whole supply chain profit significantly.          |
| (Honglin, Erbao, Kevin J, Guoqing, & Zhang, 2017) | The effect of information asymmetry on revenue sharing contracts and performance in a dual-channel supply chain | Game Theory and Revenue sharing contract                  | The performance of the dual-channel supply chain is improved if the retailer’s cost information is shared and the dual-channel supply chain reaches coordination. |
| (Lingcheng Kong, 2017)                            | Dual-channel supply chain coordination  | Bidirectional revenue-sharing contract                    | Lowering the wholesale price and raising the transfer payment coefficient will promote retailers to share revenue   |
| (Qingguo, Mingyuan, & Xu, 2017)                   | Coordinating sustainable supply chain systems   | Revenue and promotional cost-sharing, two-tariff contract | The two-part tariff contract is more robust than the revenue and promotional cost-sharing contract.   |

**5. Conclusion**

Dual/multi-channel supply chain pricing strategy and channel coordination seem to be significant research interest among the scholars. This paper involves a strategic finding of the dual/multi-channel pricing decision and coordination. Our study showed that game theory is a very widely used mechanism to determine the pricing strategy. The researcher has adopted game theory in supply chains to obtain the equilibrium strategies in the process of buying/selling. Bertrand and Stackelberg game theoretical models two mostly used pricing strategy models. It is a mathematical instrument for examining the multifaceted relations among interdependent rational competitor players. Similarly, revenue sharing contract has been used extensively to achieve the channel coordination and mitigating the channel conflict.

Plenty of research work done in dual/multi-channel pricing and coordination. However, there are still scopes for researchers to explore. Technology innovation and fast-changing nature bring a lot of challenges in business, scholar’s needs to aware of that. Future research can adopt a variety of directions. Following are some of the future

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research scopes; we believe there will be a high payoff from greater importance on the methodologies.

- A single manufacturer with multi retailers
- Dynamic pricing and equilibrium model
- Inventory and Warehouse sharing
- Coordinated Transshipment or Location-based delivery
- Product delivery lead time
- Servicing decision
- Stochastic demand
- Inter Channel Competition
- Pricing and coordination for green and sustainable product
- Enhance and effective supply chain contract

Finally, we hope that this article will stimulate more curiosity in dual/multi-channel research. Based on our review, we see many opportunities to conduct influential research in pricing and channel coordination.



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