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Dual-channel supply chain operations*

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Abstract

The rapid development of information and communication technology has induced today's general manufacturing companies in various industries to use direct sales channels as well as indirect sales channels via distributors for their product sales to end-consumers. This combined use of the two types of sales channels is referred to as a *dual-channel supply chain* or simply a *dual channel*, and the management and operations of this process by a firm are called *dual-channel supply chain operations*. Reflecting the growing number of manufacturers adopting such arrangements, dual-channel supply chain operations have become a core subject in the operations management (OM) literature. In this chapter, the author provides an overview of recent studies associated with dual-channel supply chain operations, thereby identifying key topics of focus and outlining future research directions that are worthy of investigation. Consequently, the chapter shows that, given the current real-world business environment, dual-channel supply chain operations are undoubtedly an essential current and prospective research subject that will continue to command significant attention from both researchers and practitioners.

Keywords: Dual-channel supply chain; E-commerce; Direct sales; Supply chain management

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Introduction

The rapid development of information and communication technology has enabled today's general manufacturing companies in various industries to use direct selling channels for their product sales to end-consumers. In the past, when selling consumer products, it was more common for a manufacturer to sell products wholesale to a distributor, who would subsequently resell them to consumers. This often-observed type of sales channel, in which a manufacturer sells its products through a retailer acting as a distributor, is referred to as an indirect distribution channel, and illustrated in Fig. 1.[1] Moreover, in the context of supply chain management, this single indirect distribution channel is usually referred to as a *single-channel supply chain* or simply a *single channel*. On the other hand, Fig. 2 illustrates an alternative scenario involving the combined use of two sales channels; in this situation, not only is there an indirect distribution channel but also a direct distribution channel through which the manufacturer sells directly to consumers. This situation is referred to as a *dual-channel supply chain* or simply a *dual channel*, and the management and operation of this process by a firm is termed *dual-channel supply chain operations*. Reflecting the growing number of manufacturers adopting such arrangements as shown in Fig. 2, dual-channel supply chain operations have recently become a core subject in the operations management literature.[2]

[Insert Figure 1 here]

[Insert Figure 2 here]

One particular reason why academic research on dual-channel supply chain operations has become a noteworthy subject of late is the growing need to consider not only cooperative relationships but also competitive relationships between supply chain members. Specifically, in a single-channel supply chain (Fig. 1), the manufacturer has no opportunity to earn a profit unless it sells products through the retailer; in turn, the retailer has no opportunity to earn a profit unless it purchases the products from the manufacturer and resells them to the consumer. In this sense, the manufacturer and the retailer need to foster a cooperative relationship. However, in a dual-channel supply chain (Fig. 2), the manufacturer and the retailer not only cooperate to sell products in the indirect channel but also compete for sales between the direct and indirect channels. Therefore, it should be noted that there are both upsides and downsides for manufacturers adopting a dual-channel supply chain. The upside is

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[1] If a more general supply chain is considered, the retailer shown in Figs. 1 and 2 represents a distributor. Operations management studies that construct two-echelon supply chain models frequently assume that a distributor is a retailer that resells a manufacturer's products. Therefore, throughout this chapter, I consider a typical two-echelon supply chain comprising one manufacturer and one retailer, as shown in Figs. 1 and 2, following the previous models in the literature.

[2] Chiang et al. (2003) is the first study to address the problem of dual-channel supply chain operations in the operations literature. Although the term *dual channel* literally means the use of two separate distribution channels, it is now usually used to describe a situation in which the two different types of distribution channels are combined, with both a direct and an indirect distribution channel used together. The operations management studies discussed in this chapter adhere to this definition.

that the dual channel enables the manufacturer to reach different types of consumers, thereby creating new market opportunities. The downside is channel conflict, whereby direct selling reduces the retailer's sales in the indirect channel. This occurs because, once the direct channel is established, some consumers who otherwise would have purchased from the retailer, shift to purchasing from the direct channel.[3] Particularly when consumers perceive the two channels as substitutable, this negative effect becomes more pronounced. In such a situation, the increase in demand in the direct channel significantly reduces the demand in the indirect channel below what it would have been in the absence of direct channel sales. Moreover, when the channel substitutability is high, consumers are more sensitive to the price differences between the channels, causing more intense price competition between the manufacturer and the retailer. Therefore, particularly in a dual-channel environment, an upstream manufacturer must carefully maintain its relationship with a downstream retailer to avoid the occurrence of a channel conflict between the manufacturer and the retailer, which would lead to the entire supply chain becoming unable to supply an adequate level of quantity at an appropriate price, hindering total supply chain optimization. In summary, dual-channel supply chain operations require consideration of both cooperation and competition between supply chain members, and hence this subject has become increasingly critical in academic research, reflecting the radical changes in supply chain structure driven by technological advances.

In this chapter, I provide an overview of recent studies associated with dual-channel supply chain operations, as summarized in Table 1, thereby identifying key topics of focus and outlining future research directions that are worthy of investigation.[4] Because several specific topics are considered particularly important in this subject, this chapter is organized by classifying the topics into separate sections to elucidate the research trends within this subject. All of the topics introduced below are being discussed in ongoing academic research and are considered essential in practical terms.[5]

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[3] Tsay and Agrawal (2004) elaborate on a number of real-life cases of channel conflicts that have arisen in dual-channel supply chains. One example is the case of Home Depot, which sent a letter to manufacturing companies that supplied products to Home Depot, warning them to avoid selling directly to consumers. Matsui (2020, 2022b) summarizes more recent cases of channel conflicts where an e-commerce platform (e.g., Amazon) plays the role of a retailer and engages in intense negotiations with manufacturers who are suppliers of the platform. Overall, the cases tend to demonstrate that ultimately, a manufacturer fails to achieve its desired sales outcomes in a dual-channel supply chain because it yields to the various demands of downstream retailers.

[4] When a manufacturer that originally had only a single-channel supply chain, as in Fig. 1, adds a direct channel, thus adopting a dual-channel supply chain, as in Fig. 2, this transition is referred to as *supplier encroachment* or *manufacturer encroachment*. Research on supplier encroachment is associated closely with research on dual-channel supply chain operations. Specifically, how supply chain members, including a downstream retailer, should respond to supplier encroachment is examined in the literature (e.g., Li et al., 2014; Hamamura and Zennyo, 2021).

[5] As Yue and Liu (2006) suggest, supply chain management models are classified according to whether the manufacturing strategy is make-to-order (MTO) or make-to-stock (MTS). In

[Insert Table 1 here]

Decision Timing

The configuration of power relationships between upstream and downstream firms within supply chains is a vital issue in real-world business environments. In the operations management literature, a member in a supply chain that can set its decision variables, such as the selling price, earlier than another member, is considered to have greater power (Shen et al., 2019). Therefore, the order in which firms in the supply chain make decisions is conventionally referred to as the *power structure* (Matsui, 2021). Because this order usually affects the economic consequences for the supply chain members, including their profits, many operations management studies analyze the impact of the order or the timing of the decision-making on supply chain performance by constructing mathematical models.

In practice, when a firm within a supply chain makes a decision, such as a pricing decision, it will encounter the following critical question: is it more advantageous to make decisions before the other members of the supply chain, or to wait and make decisions after observing the decisions made by others? When considering this issue of the desirable timing of decision-making, it is important to note the following conventional wisdom of the game-theoretic research. Gal-Or (1985) shows that when the decision variable that each player determines in a noncooperative game has a property called *strategic substitutability*, the player who makes the decision first obtains a higher payoff than the other players, which means that a *first-mover advantage* arises. This strategic substitutability means that if one player increases its decision variable, the other player responds by decreasing their decision variable, resulting in a negative correspondence between the players' decision variables. In relation to this game-theoretical insight, Choi (1991) and Lee and Staelin (1997) show that when a firm in a supply chain decides on its margin from dealing in a product, the margin has strategic substitutability in a broad range of environments. Because of this strategic substitutability, if one member increases its margin in a game where two supply chain members are involved, the other member will decrease its margin in response. This means that when a manufacturer and a retailer constitute a typical indirect channel, the firm that sets its margin first earns a higher profit than the firm that sets its margin later, meaning that the first-mover advantage arises. When investigating the desirable timing for decision-making in supply chains, including dual-channel supply chains, it is essential to consider this first-mover advantage that pertains to the setting of firms' margins.

The order in which players make their decisions affects their payoffs not only in games

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the case of MTO, because it is assumed that the quantity supplied always matches the quantity demanded at the time of a transaction, the market immediately clears. By contrast, in the case of MTS, supply does not necessarily match demand, and usually either the seller runs out of stock despite there being demand for the products, or some products remain unsold. Following the seminal work by Chaing et al. (2003), most recent papers on dual-channel supply chain operations construct MTO models. Therefore, this chapter consistently focuses on MTO models.

played within supply chains but also in more general games. Therefore, Hamilton and Slutsky (1990) devise a specific game called a *timing game*, in which not only the level of the decision variables determined by players but also the order in which the decisions are made is endogenously determined as an equilibrium (i.e., a stable state) within the game based on the players' incentives. More specifically, a timing game considers a situation in which a player can choose to be the first mover or the second mover in making a decision. A player will make the first (second) move if they obtain a higher payoff by taking the first (second) move. Therefore, in a two-player game, if one player gains a higher payoff by taking the first move while the other gains a higher payoff by taking the second move, then the equilibrium of the timing game is a situation in which these players take the first and the second moves, respectively. This means that in equilibrium, the stable state is one in which the players make their decisions sequentially rather than simultaneously.

The study by Matsui (2017) was the first to apply the timing game framework to supply chain management research. Specifically, Matsui (2017) explores the optimal timing for a manufacturer using a dual-channel supply chain (as shown in Fig. 2) to set the wholesale price in the indirect channel and the direct price in the direct channel. His results show that the manufacturer can obtain the highest profit by determining the direct price before or at the same time as determining the wholesale price, which constitutes a stable equilibrium in the timing game. The fundamental reason for this conclusion is that the first-mover advantage explained earlier arises in the determination of the respective margins for the manufacturer and the retailer. That is, if the manufacturer first decides on the direct price for the direct channel and subsequently decides on the wholesale price for the indirect channel in the dual-channel supply chain, the manufacturer can fix the margin for the direct channel before the retailer decides on the retail price, and thus the manufacturer can secure the first-mover advantage. Conversely, if the manufacturer decides on the direct price after the wholesale price, the retailer will have an incentive to decide on the retail price at an earlier stage, jumping ahead of the manufacturer's decision on the direct price. If the retailer actually sets its margin before the manufacturer sets its margin in the direct channel, the retailer deprives the manufacturer of the first-mover advantage. Consequently, the manufacturer must set its direct price before or at the same time as the wholesale price to prevent the retailer from gaining the first-mover advantage, which provides a practical decision-making guideline for manufacturers managing dual-channel supply chains.

The reason for introducing the timing of decision-making by supply chain members as the first topic of this chapter is that it fundamentally influences the results obtained by studies on channel structure design, the topic discussed in the next section.

Channel Structure

A fundamental supply chain issue for a general manufacturing company is the selection of the type of distribution channel(s) to use for selling products to end-consumers. Given that, especially in today's world, technological advances make it easier for even small manufacturers to commence direct selling, the problem of designing dual-channel supply

chain structures is discussed extensively in the recent operations management literature. One typical problem encountered by a manufacturer that can use a dual-channel supply chain is determining which of the following three channel strategies is the most profitable: selling through an indirect channel only, selling through a direct channel only, or selling through both channels.

Since the 2000s, several researchers have explored which distribution channel should be used in a typical dual-channel supply chain situation not only to create a cooperative relationship but also to mitigate channel conflict between a manufacturer and a retailer. Seminal work addressing this problem by Chiang et al. (2003) investigates the optimal channel strategy for a manufacturer choosing whether to sell its products directly using the Internet, only via a retailer, or by using a mix of both channels. They show that the use of the direct channel enhances the manufacturer's profitability because it mitigates the inefficient double marginalization that potentially arises in the indirect channel. Following Chiang et al. (2003), Cattani et al. (2006) analyze the impact of an equal-pricing strategy, in which a manufacturer with a dual-channel supply chain aims to mitigate channel conflict by setting the same retail prices for direct and indirect channels, on supply chain profitability. Their results show that whereas the equal-pricing strategy is optimal for the manufacturer and the entire supply chain under broad environments, the manufacturer has an incentive to abandon the equal-pricing strategy when the efficiency of the direct channel becomes sufficiently improved. Yue and Liu (2006) develop a stochastic model in which a two-echelon dual-channel supply chain composed of a manufacturer and a retailer faces demand uncertainty, and assess the economic consequences of the two firms sharing demand information.

Following the works of the early 2000s, Matsui (2016) assumes a situation where two manufacturers competing on price operate their own dual-channel supply chains, and investigates which distribution channel each manufacturer should use to maximize its own profit. He shows that even when the two manufacturers are characterized by identical cost and demand conditions, and thus are perfectly symmetric, an asymmetric channel structure is formed between the two manufacturers in a stable equilibrium. More specifically, in equilibrium, one manufacturer uses both direct and indirect channels, whereas the other uses only the direct channel to sell products to end-consumers.

The mechanism underlying this counterintuitive result is associated with the following insights from the game-theoretic research. Gal-Or (1985) shows that in a noncooperative two-player game, if the decision variables of the players are characterized by the property of *strategic complementarity*, then a *second-mover advantage* arises, such that the player who makes a decision later than the other player will obtain a higher payoff. This strategic complementarity means that if one player increases a decision variable, the other player also increases their decision variable in response, resulting in a positive correspondence between the players' decision variables. Hence, strategic complementarity is the opposite of strategic substitutability, as explained in the previous section. Gal-Or (1985) also demonstrates that when firms in a horizontal relationship engage in price competition, their prices, as the firms' decision variables, tend to be characterized by strategic complementarity. That is, in a situation where two firms set the sales prices of their respective products, if one firm

increases its price, the other firm will increase its price in response. Furthermore, van Damme and Hurkens (2004) determine that when decision variables possess strategic complementarity, both players can increase their payoffs by staggering the timing of their decision-making on their respective decision variables, thereby making sequential rather than simultaneous decisions. Given these game-theoretic insights, Matsui (2016) reveals that two symmetric manufacturers choose different time points for making their price decisions by strategically adopting asymmetric supply chain structures, which enable both manufacturers to obtain higher profits. In this sense, the desirable structure of the supply chain for the manufacturers is closely associated with the desirable timing of their decisions, which was thus elaborated in the previous section.

Bargaining

The terms and conditions of transactions determined between supply chain members are naturally the focus of supply chain management, and thus are also the continuous subject of academic analyses. Specifically, wholesale prices usually represent major terms of trade between members at different echelons of a supply chain. Because the wholesale price is also a measure that directly reflects the power relationship between a manufacturer and a distributor, operations management models often focus on how wholesale prices are determined. The manner in which a manufacturer in the upstream of a supply chain unilaterally sets the wholesale price and imposes it on a downstream retailer is observed in actual wholesale contracts. Meanwhile, the way in which upstream and downstream firms mutually bargain over and settle the wholesale price is also observed in practice. Therefore, the level at which wholesale prices are determined through negotiations is a key issue for supply chain management. In the 2000s, research began to emerge that addresses the issue of bargaining over the wholesale price between supply chain members by applying the framework of Nash bargaining, which was originally developed in cooperative game theory (e.g., Dukes et al., 2006).

In this line of research, Matsui (2022b) considers the following two scenarios: (i) the wholesale price is unilaterally determined by a manufacturer and imposed on a retailer, and (ii) the wholesale price is determined through bargaining between a manufacturer and a retailer. By comparing the profitability between the two scenarios, Matsui (2022b) examines whether the retailer should bargain over the wholesale price with the manufacturer. He initially shows the benchmark result that when the upstream manufacturer can use only a single-channel supply chain (i.e., an indirect channel) to sell products (that is, the situation shown in Fig. 1), the retailer achieves a higher profit in the second scenario than in the first scenario, and thus should always bargain over the wholesale price with the manufacturer. Conversely, however, when the manufacturer has a dual channel (the situation in Fig. 2), environments exist in which the first scenario can be more profitable for the retailer than the second scenario, meaning that the retailer can earn a higher profit by strategically shunning bargaining over the wholesale price, instead purchasing at the price unilaterally determined by the manufacturer. This result arises because if a retailer bargains over the wholesale price

in the dual-channel situation, refusing to accept the price dictated by the upstream manufacturer, then the manufacturer may have an incentive to sell all of its products through the direct channel without going through the retailer in the indirect channel. If the manufacturer sells only via the direct channel, the retailer completely loses the opportunity to sell the manufacturer's products through the indirect distribution channel, thereby losing its profit opportunity. To prevent this disintermediation, the retailer should not bargain over the wholesale price with the manufacturer.

Matsui (2022b) further shows that when consumers perceive little differentiation between direct and indirect channels, or when the retailer has more bargaining power than the manufacturer, the above result tends to hold for the following reasons. First, if consumers perceive little differentiation between the direct and indirect channels, the manufacturer can completely avoid serious channel conflict by selling only through the direct channel, where no margin is extracted by the retailer, and the manufacturer thereby obtains a greater profit. To prevent such behavior by the manufacturer, the retailer should not bargain with the manufacturer to avoid losing the opportunity to sell the manufacturer's product. Second, if the retailer has too strong a bargaining power relative to the manufacturer, the manufacturer can achieve a higher profit by selling only through the direct channel and shunning the indirect channel because the manufacturer would lose a large margin if it sold its product through the powerful retailer. Under such circumstances, it is more profitable for the retailer to avoid bargaining over the wholesale price with the manufacturer.

In a similar vein, Matsui (2020) explores the desirable timing for a manufacturer using a dual-channel supply chain to conduct wholesale price bargaining with a retailer. The results show that the optimal timing of bargaining for the manufacturer is to bargain over the wholesale price before determining the price of the product in the direct channel. The reason for this conclusion is that by determining the direct price after the wholesale price is determined and fixed, the manufacturer can retain an option to adjust the direct price flexibly depending on whether the bargaining outcome is successful or unsuccessful. That is, by bargaining over the wholesale price before determining the direct price, the manufacturer can flexibly adjust the direct price and sell the products through the direct channel even if the bargaining with the retailer breaks down. By retaining the ex post option of adjusting the direct price, the manufacturer can steer the wholesale price negotiations in a direction that is favorable to it. In game theory, it is well known that, for a player to sway negotiations in Nash bargaining in their own favor, it is essential to increase their alternative gain from an outside option when the negotiation breaks down, which is called the *disagreement point*. Therefore, this conventional game-theoretic insight is confirmed in the bargaining game over the terms of trade (e.g., the wholesale price) between a manufacturer and a retailer that constitute a supply chain.

E-commerce Platform

Dual-channel supply chain operations can also be investigated in the situation where the retailer illustrated in Fig. 2 is replaced with an e-commerce platform, such as Amazon,

which significantly increases its presence as a reseller as well as an intermediary. Recently, Matsui (2024) assumes a situation in which two manufacturers facing price competition both have dual-channel supply chains involving an e-commerce platform. That is, considering Fig. 2, Matsui (2024) assumes the retailer in the dual-channel supply chain of each manufacturer is replaced with an e-commerce platform. Moreover, if a manufacturer sells its products through the platform, it can conclude either an agency contract or a wholesale contract because a real-world platform plays the role of an intermediary rather than that of a reseller if an agency contract is adopted. For example, a manufacturer using the Amazon marketplace decides on the retail price of its product, lists it on the marketplace, and then pays a commission fee after the sale of the product is realized. Using this setting, Matsui (2024) investigates which of the following three channel strategies yields the highest profit for each manufacturer: selling through an indirect channel only, selling through a direct channel only, or selling through both channels. Matsui (2024) shows that even when the two manufacturers are characterized by identical cost and demand conditions, and thus are perfectly symmetric, two competing manufacturers choose asymmetric distribution channel structures in equilibrium, as in Matsui (2016). More specifically, the results show that in equilibrium, one manufacturer sells exclusively through the direct channel, whereas the other manufacturer uses both the direct and indirect channels, with the latter concluding only a wholesale contract, never an agency contract.

As the number of studies relating to dual-channel supply chains increases, research into supply chains involving e-commerce platforms is rapidly becoming more popular in the operations management literature, and is expected to continue to expand in the future.

Reverse Supply Chain

In general, a supply chain can be categorized as either a forward supply chain, which is the channel through which products are sold to end-consumers, or as a reverse supply chain, which is a collection channel for used products. Because awareness of the importance of environmental issues is growing worldwide, the issue of how manufacturers can collect as many used or end-of-life products as possible has become important not only as a managerial decision but also as a socially critical problem. It is an issue commanding considerable attention from business practitioners and regulators as well as academic scholars. The issue of the coordination and competition among firms to collect used products is analyzed by constructing game-theoretic models. Guo et al. (2017) comprehensively review a growing number of studies examining the operation of reverse supply chains. The seminal study by Savaskan et al. (2004) develops a stylized model determining the optimal structure of a reverse supply chain for collecting used products from existing consumers. Specifically, they assume a situation in which a manufacturer can choose one of three modes of collecting used products: (i) directly collecting products from consumers, (ii) outsourcing collection activity to an external retailer, or (iii) outsourcing collection activity to an external third party. Comparing the manufacturer's equilibrium profits in these three scenarios, Savaskan et al. (2004) conclude that outsourcing to the retailer is better for the manufacturer than the other

modes. Choi et al. (2013) examine how the profitability of a reverse supply chain consisting of one manufacturer, one retailer, and one collector depends on the decision timing of their collection efforts. They show that the most efficient reverse supply chain can be achieved when the retailer is the first party of the three to decide on its collection effort. Bulmus et al. (2014) construct a reverse supply chain model in which an original equipment manufacturer (OEM) and an independent remanufacturer compete in terms of their acquisition prices of used products. They assume that the OEM sells both new and remanufactured products in a forward supply chain, whereas the remanufacturer sells only remanufactured products. They show that the OEM's acquisition price depends only on its own cost structure, not on the remanufacturer's acquisition price.

Recently, reverse supply chain management has become a key academic topic from the perspective of dual-channel supply chain operations because several manufacturing companies have begun using not only an indirect collection channel, in which they purchase used products indirectly from consumers through external independent firms, but also a direct collection channel, purchasing and collecting used products directly from consumers. The reverse supply chain in which a manufacturer combines these direct and indirect collection channels is called a *dual-recycling channel reverse supply chain*. From a practical perspective, because competition can arise among supply chain members to collect used products, it is as important to mitigate channel conflict in a dual-recycling channel reverse supply chain as in a forward dual-channel supply chain.

Assuming a situation in which a manufacturer uses a dual-recycling channel reverse supply chain to collect used products, Matsui (2022a) investigates the optimal timing for the manufacturer to announce the purchase price of used products collected from consumers. In addition, Matsui (2023) explores which of the following three channel strategies is most profitable for manufacturers when two manufacturers each have dual-recycling channels and compete on the purchase price of the used products: a direct collection channel only, an indirect collection channel only, or a combination of both. That is, in the context of reverse supply chain management, Matsui's recent studies (2022a and 2023, respectively) address analogous problems to those addressed in his two earlier studies of the forward supply chain (2017 and 2016, respectively). Consequently, Matsui (2022a) concludes that a manufacturer using a dual-recycling channel should announce the purchase price of used products to consumers in the direct collection channel before determining the purchase price in the indirect collection channel. Matsui (2023) shows that the use of an asymmetric form of collection channels between two symmetric manufacturers is a stable equilibrium.

Overall, there are two particular points to note when addressing issues relating to the management of dual-recycling channel reverse supply chains. First, whereas a *demand function system* for products is used to construct a mathematical model describing a forward supply chain, a *supply function system* for used products is used to construct a model describing a reverse supply chain. Second, in contrast to the forward supply chain, consumers who sell their used products perceive little differentiation between firms that competitively purchase and collect products in the reverse supply chain. That is, in a forward supply chain, consumers typically perceive products supplied by different manufacturers as differentiated

because the consumers often have brand loyalties to products supplied by a specific manufacturer. By contrast, in a reverse supply chain, consumers are not likely to perceive any differentiation among companies because there is normally no factor that creates consumer loyalty to a specific company that only purchases used products. Rather, consumers are expected to simply sell their used products to the company that offers a higher purchase price. Thus, firms constituting the reverse supply chain are more likely to face intense competition than firms constituting the forward supply chain. These are important features to note when constructing an operations management model that describes the dual-recycling channel reverse supply chain.

Conclusions

Given that an increasing number of general manufacturers have commenced using direct distribution channels, dual-channel supply chain operations have become a critical subject in the operations management literature in recent years. In this chapter, I have identified major topics associated with the subject in respective sections by overviewing recent key studies. All of the topics introduced are the subject of substantial discussions in the operations management literature.

As a final remark for this chapter, given the rapid advances in e-commerce technologies, it is highly likely that new topics beyond those outlined in this chapter will emerge not only within operations management but also across a broader range of other academic areas, such as information systems. From this perspective, dual-channel supply chain operations are undoubtedly an essential and prospective research subject that will continue to command significant attention from both academic researchers and practitioners given the current real-world business environment.

Takeaways for operations managers

For operations managers, this chapter highlights specific topics of which they should be aware of when implementing dual-channel supply chain operations. Specifically, because manufacturers in various industries now need to use diverse sales channels, they can learn about the ways in which they can both foster cooperative relationships with supply chain members and reduce conflicts between them. For example, from this chapter, operations managers can learn when to set direct sales prices, and under what circumstances it is advantageous to actively negotiate trading conditions with other supply chain members. These insights can be used to support the operations managers' decision-making.

Takeaways for researchers

Researchers can leverage the individual topics introduced in this chapter and insights from previous research to further investigate practical and academic issues in dual-channel supply chain operations. The central component of research on this subject is considering how to foster cooperation while mitigating competition among supply chain members. Given the rise of e-commerce platforms and the increasing social importance of reverse supply chains, new problems, beyond the topics outlined in this chapter, may emerge that require practical solutions. From these perspectives, and given the current real-world business environment, dual-channel supply chain operations will continue to represent a worthwhile prospective topic for future researchers to understand and address.

Glossary

Bargaining Supply chain members often engage in bargaining or negotiation over the terms of product transactions (e.g., the wholesale price). *Nash bargaining*, which is classified as a cooperative game, is often used as a tool for determining the terms of transactions in the operations management literature. Bargaining is an important topic because conflict among supply chain members is likely to occur in dual-channel supply chain situations.

Channel conflict A state of conflict that occurs among supply chain members using different sales channels. For example, it is common for conflict to arise between a manufacturer using a direct sales channel and a retailer that exists in an indirect sales channel because of sales competition. Therefore, addressing channel conflict is essential when considering dual-channel supply chain operations.

Dual-channel supply chain A system or strategy involving the use of both direct sales channels and indirect sales channels via distributors for product sales to end-consumers.

E-commerce platform In contrast to regular distributors (e.g., retailers and wholesalers), which earn a profit by purchasing and reselling products, an e-commerce platform not only resells products or services, but usually faces a multisided market and makes a profit from each.

Power structure Originally used in discussing which supply chain member has more power than other members in the context of supply chain management, this term has evolved over time. Now, the most powerful supply chain member is referred to as the party that possesses leadership in the sense of being able to determine its decision variable earlier than other members of the supply chain.

Reverse supply chain The collection channel for used or end-of-life products. The antonym is *forward supply chain*.

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References

Bulmus, S.C., Zhu, S.X., Teunter, R.H., 2014. Competition for cores in remanufacturing. European Journal of Operational Research 233 (1), 105–113.

Cattani, K., Gilland, W., Heese, H.S., Swaminathan, J., 2006. Boiling frogs: Pricing strategies for a manufacturer adding a direct channel that competes with the traditional channel. Production and Operations Management 15 (1), 40–56.

Chiang, W.-Y.K., Chhajed, D., Hess, J.D., 2003. Direct marketing, indirect profits: A strategic analysis of dual-channel supply-chain design. Management Science 49 (1), 1–20.

Choi, S.C., 1991. Price competition in a channel structure with a common retailer. Marketing Science 10 (4), 271–296.

Choi, T.-M., Li, Y., Xu, L., 2013. Channel leadership, performance and coordination in closed loop supply chains. International Journal of Production Economics 146 (1), 371–380.

van Damme, E., Hurkens, S., 2004. Endogenous price leadership. Games and Economic Behavior 47 (2), 404–420.

Dukes, A.J., Gal-Or, E., Srinivasan, K., 2006. Channel bargaining with retailer asymmetry. Journal of Marketing Research 43 (1), 84–97.

Gal-Or, E., 1985. First mover and second mover advantages. International Economic Review 26 (3), 649–653.

Guo, S., Shen, B., Choi, T.-M., Jung, S., 2017. A review on supply chain contracts in reverse logistics: Supply chain structures and channel leaderships. Journal of Cleaner Production 144, 387–402.

Hamamura, J., Zennyo, Y., 2021. Retailer voluntary investment against a threat of manufacturer encroachment. Marketing Letters 32, 379–395.

Hamilton, J.H., Slutsky, S.M., 1990. Endogenous timing in duopoly games: Stackelberg or Cournot equilibria. Games and Economic Behavior 2 (1), 29–46.

Lee, E., Staelin, R., 1997. Vertical strategic interaction: Implications for channel pricing strategy. Marketing Science 16 (3), 185–207.

Li, Z., Gilbert, S.M., Lai, G., 2014. Supplier encroachment under asymmetric information. Management Science 60 (2), 449–462.

Matsui, K., 2016. Asymmetric product distribution between symmetric manufacturers using dual-channel supply chains. European Journal of Operational Research 248 (2), 646–657.

Matsui, K., 2017. When should a manufacturer set its direct price and wholesale price in dual-channel supply chains? European Journal of Operational Research 258 (2), 501–511.

Matsui, K., 2020. Optimal bargaining timing of a wholesale price for a manufacturer with a retailer in a dual-channel supply chain. European Journal of Operational Research 287 (1), 225–236.

Matsui, K., 2021. Power structure and profitability in a three-echelon supply chain facing stochastic demand. Computers & Industrial Engineering 160, 107246.

Matsui, K., 2022a. Optimal timing of acquisition price announcement for used products in a dual-recycling channel reverse supply chain. European Journal of Operational Research 300 (2), 615–632.

Matsui, K., 2022b. Should a retailer bargain over a wholesale price with a manufacturer using

a dual-channel supply chain? European Journal of Operational Research 300 (3), 1050–1066.

Matsui, K., 2023. Dual-recycling channel reverse supply chain design of recycling platforms under acquisition price competition. International Journal of Production Economics 259, 108769.

Matsui, K., 2024. Should competing suppliers with dual-channel supply chains adopt agency selling in an e-commerce platform? European Journal of Operational Research 312 (2), 587–604.

Savaskan, R.C., Bhattacharya, S., van Wassenhove, L.N., 2004. Closed-loop supply chain models with product remanufacturing. Management Science 50 (2), 239–252.

Shen, B., Choi, T.-M., Minner, S., 2019. A review on supply chain contracting with information considerations: Information updating and information asymmetry. International Journal of Production Research 57 (15–16), 4898–4936.

Tsay, A., Agrawal, N., 2004. Channel conflict and coordination in the e-commerce age. Production and Operations Management 13 (1), 93–110.

Yue, X., Liu, J.J., 2006. Demand forecast sharing in a dual-channel supply chain. European Journal of Operational Research 174 (1), 646–667.

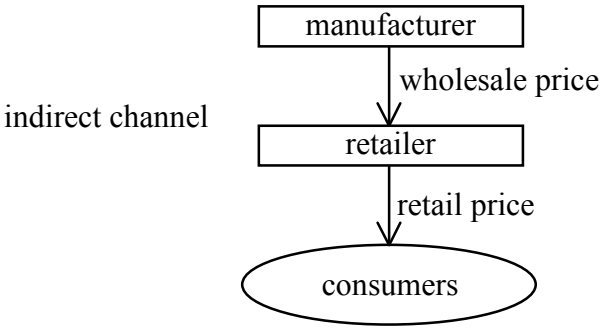

Figure 1 Single-channel supply chain

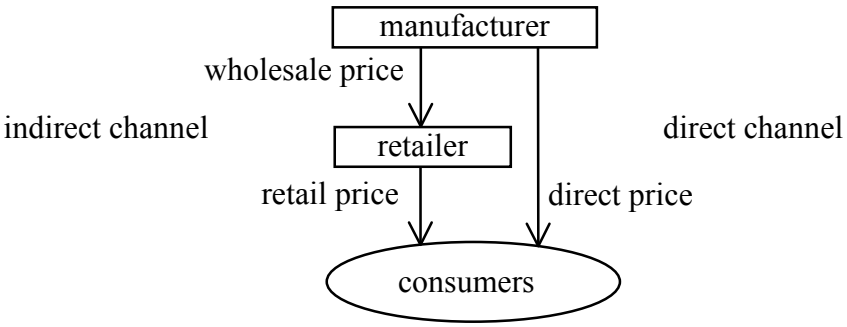

Figure 2 Dual-channel supply chain

Topic	Research focus	Major implications from existing research
Decision timing	Whether it is advantageous for a supply chain member to make decisions before other members, or to wait and make decisions after observing the decisions made by others.	A first-mover advantage arises with respect to price setting. As such, the optimal decision timing significantly affects profitability in a supply chain.
Channel structure	Which channel should be selected and used in a dual-channel supply chain (i.e., the direct channel only, the indirect channel only, or both channels).	The desirable channel structure alters depending on the competitive situation and the timing of the decision-making by the supply chain members.
Bargaining	Bargaining over the terms of transactions between supply chain members.	Whereas a supply chain member should bargain in the case of a single-channel supply chain, it must consider carefully whether to bargain in the case of a dual-channel supply chain.
E-commerce platform	Which contract should be made when an e-commerce platform is used in a dual-channel supply chain (e.g., agency selling or reselling).	The selection of an agency selling or a reselling contract depends on the state of competition, and has a significant influence on a supply chain members' profitability.
Reverse supply chain	How a reverse supply chain, which differs from a forward supply chain, should be managed in the context of dual-channel supply chain operations.	Often, the literature obtains the same results for the desired channel structure and timing of decision-making for the reverse supply chain as for the forward supply chain.

Table 1 Summary of major research topics