Supply Chain Coordination Under Retail Competition: Literature Review and Research Opportunity

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Abstract

In retail competition, coordination between suppliers and retailers to match the supply and demand is the key to increasing the overall supply chain profits. To ensure the achievement of the coordination objectives, a mechanism is needed that can guarantee profits for all supply chain members. This paper will provide an overview of the supply chain coordination mechanism when there is competition between retailers. This review will focus on two things, namely, supply chain coordination and competition between retailers that are influenced by promotional strategies and customer preferences. This study can provide information related to the existing supply chain coordination literature and retailer competition so that it can provide an overview of the limitations of research on supply chain coordination in retail competition.

Keywords
Supply chain coordination, cooperation, enterprises, retail competition, pricing strategy, customer preference

1. Introduction
Coordination among members has an important role in improving supply chain performance. This coordination requires each member of the supply chain to share information and take into account the impact of their actions on other members. The efforts made by each member to maximize their profits result in conflicting goals between supply chain members. As a result, overall supply chain profits will decline. Therefore, if a supply chain network is optimized as a whole, the level of decision consistency will increase and the profits will also increase (Nematollahi et al. 2017).

In a supply chain system, a manufacturer who can be positioned as a supplier produces and sells products to several retailers and then the retailer adds value to a product and sells the finished product to the customer. Competition between retailers is inevitable when customer demand is price sensitive and some demand can be substituted (Xiao et al. 2007). More competition among retailers in the market will facilitate price comparisons, Boatwright et al. (2004) identified the impact of this, namely increasing price sensitivity and customers will be more responsive to price decreases when there is a temporary promotion.

This paper aims to provide an initial literature review regarding supply chain coordination when retailers are competing and explore various coordination models proposed by previous research. The literature study was carried out in two stages, starting with a literature study on supply chain coordination when there was a retailer competition and then a literature study on retailer competition that was influenced by promotional strategies and customer preferences. The contribution of this paper is a complement to previous research on supply chain coordination and pricing strategies for retailers. This paper also provides a more comprehensive overview of future research opportunities in the supply chain.

The remaining of this paper is organized as follows. Section 2 and 3 represent the resulting paper classification. Section 2 shows the literature on supply chain coordination and retailer competition. Then, it is followed by section 3 presents the previous work on retailer pricing strategy and customer preferences. After that, section 4 discusses the gaps between these studies. And finally, the conclusion is presented in section 5.

2. Supply Chain Coordination and Retailer Competition

Coordination can increase the total supply chain profit and benefit all members if their decisions are aligned. This coordination requires each member to share information and take into account the impact of each of his actions on other members. However, there is a possibility that optimizing the entire network from a supply chain point of view may be detrimental to some of its members. As a result, this decision may not be agreed upon by other supply chain members, so a mechanism is needed that can guarantee benefits for all members. Lee (2000) stated that the identified incentive alignment mechanism can provide various mechanisms that distribute benefits and risks so that it can motivate independent actors to achieve profitability in the supply chain.

A supply chain works best if the incentives among its members are aligned, that is, if the risks, costs, and benefits of its business activities are distributed fairly across the network (Narayanan and Raman 2004). Munson and Rosenblatt (2001) researched this by integrating purchasing and production in 3 levels of the supply chain and exploring the benefits of quantity discounts on suppliers and customers to reduce costs. Li and Liu (2006) developed a model related to the quantity discount policy in which the results explain that a certain quantity discount limit will increase supplier-buyer profits because a joint decision is obtained. Duan et al. (2010) investigated the application of quantity discounts in coordinating replenishment decisions in the vendor-buyer system for items with a fixed life cycle. Research on this topic is also of interest to many other researchers including Chang et al. (2010), Heydari (2014), Huang et al. (2011), Kamali et al. (2011), Nie and Du (2017), Ponte et al. (2020), Venegas and Ventura (2018), Yin et al. (2015), and Zissis et al. (2015).

In practice, supply chain coordination with quantity discounts as a coordination mechanism is needed even when there is competition between retailers. Parthasarathi et al. (2011) investigate the role of quantity discounts and return policies in the coordination of a supply chain. The manufacturer provides quantity discounts to two competing retailers who face price-sensitive, stock-dependent, and uncertain demand. This paper captures the stock dependency phenomenon and investigates the role of quantity discounts and returns policies in the coordination of a supply chain.

David and Adida (2015) studied coordination and competition in the supply chain where a single supplier operates a direct channel and sells its products through several different retailers. In the analysis, suppliers in supply chains with symmetric retailers are more profitable if they have as many retailers as possible. The researcher also finds that some contracts can coordinate the single-channel supply chain but not the two-channel supply chain, therefore the researcher proposes a linear quantity discount contract to perfectly coordinate the two-channel supply chain with symmetric retailers.

Chen and Xiao (2017) investigated pricing and replenishment practices in the supply chain when retailers compete in different ways. The comparative analysis demonstrates how retail behavior influences retail price and replenishment decisions. The researcher finds that retail cooperation is not stable since each self-interested retailer has an incentive to lower his retail price unilaterally. Finally, to improve the performance of the channel and each member, a Groves wholesale price contract is designed to achieve the perfect coordination between the supplier and the retailers. Other researchers who have investigated the topic of coordination and competition include Hosseini-Motlagh et al. (2018), Ingene and Parry (1995), and Xiao et al. (2007). Some literature related to supply chain coordination can be summarized in table 1 below:

Table 1. Literature review on supply chain coordination

Author(s)	Dependent Variable	Independent Variable	Result
Charles L. Munson and Meir J. Rosenblatt (Munson and Rosenblatt 2001)	Supply chain cost	Quantity discount to dictate channel lot size	• Significant cost reduction occurs when quantity discounts are applied upstream and downstream of the supply chain. • The decentralized system is more profitable overall
Jianli Li and Liwen Liu (Li and Liu 2006)	Supply chain profit	Quantity discount policy	• The performance of all supply chain members will improve if there is coordination and joint decision-making. • Applying the methods that have been designed can increase profits for both buyers and suppliers
Yongrui Duan, Jianwen Luo, Jiazhen Huo (Duan et al. 2010)	Supply chain cost	Quantity discount strategy	• Both the total vendor cost and the total system cost can be reduced despite many parameter changes. • Quantity discounts offered by vendors to buyers can not only compensate for increased costs but also provide additional savings to buyers.
G. Parthasarathi, S. P. Sarmah, and M. Jenamani (Parthasarathi et al. 2011)	Supply chain profit	Quantity discount and return policies	• Contract mechanism fails to coordinate when the value of price sensitivity factor approaches the value of cross-price sensitivity factor
Amy David and Elodie Adida (David and Adida 2015)	Supply chain profit	Linear quantity discount contract	• Numerically, competition between retailers and linear quantity discount contracts can mitigate the supply chain inefficiency
Kebing Chen and Tiaojun Xiao (Chen and Xiao 2017)	Supply chain performance	Groves wholesale price contract	• The retail competition can lead to higher-order quantities and incentive mechanisms can increase the efficiency of the retail cooperation. • Grove wholesale price is designed to avoid the double marginalization effect and improve the channel performance.

3. Pricing Strategy and Customer Preference

Retailers become active designers and controllers of the supply of a product in response to consumer demand (Fernie and Sparks 2014). Retailers control, regulate and manage the supply chain from production to consumption. With this increasing role, retailers have the opportunity to influence demand by choosing the right sales/promotion strategy to compete with other retailers. This sales strategy consists of advertising, after-sales service, and promotions such as discounts and gifts (Pu et al. 2019).

In addition, more competition between retailers in the market will facilitate price comparisons, the impact of price sensitivity will increase and customers will be more responsive to price reductions when there are temporary promotions (Boatwright et al. 2004). In their findings, Das and Kumar (2009) state that price reduction or price discount is the first place that customers are interested in when retailers offer promotions, where the next rank is the buy one, get one and buy one get one product free schemes. In implementing price reduction, retailers must consider the size of the discount or discount depth and the frequency of price discounts (table 2).

Table 2. Literature review on Pricing Strategy and Customer Preference

Author(s)	Dependent Variable	Independent Variable	Result
Hu Huang, Hua Ke, Lei Wang (H. Huang et al. 2016)	Sales price and profit of the SC members, the quantity of the product.	Retailers' collusion behaviors and power structures	• The two retailers' collusion behaviors will increase the sales prices and reduce the quantities of the products regardless of the power structures
Shan-Lin Yanga, Yong-Wu Zhou (Yang and Zhou 2006)	Sales price and profit of the SC members, the quantity of the product.	Competitive behaviors (Cournot, Collusion, and Stackelberg)	• The duopolistic retailers' action in collusion makes the retailers charge the highest sale price while the duopolistic retailers' Cournot behavior results in the lowest pricing of the retailer. • The more drastic the duopolistic retail market competes, the higher the manufacturer and the duopolistic retailer pricing should be. • The total profit of the duopolistic retailers who act as the followers will exceed the more powerful manufacturer's profit as long as the degree of dissimilarity between the duopolistic retailers' market demands is large enough.
K. Sivakumar (Sivakumar 1996)	High and low price product	Frequency and depth of the price promotion	• Infrequent or low frequency and high price cut scenarios are more profitable than other scenarios for brands with high prices. On the other hand, high frequency and shallow price cut scenarios are stated to be more profitable than other scenarios for brands with low prices
Matthew Osborne (Osborne 2018)	Quantity sold and revenue	Frequency and depth of promotion	• Increasing depth while lowering frequency is more effective than simply increasing depth.
Niniet I. Arvitrida, Adji Candra, Nurhadi Siswanto, Lila Yuwana (Arvitrida et al. 2019)	Customer preferences	Frequency and depth of the price promotion	• The high-shallow strategy has a meaningful impact on retailer profit, sales, and market share when the competitors implement a low-deep strategy.
Rifqi Jalu Pramudita (Pramudita 2020)	Customer Preferences, Profit, sales, and lost sales at retailers, supplier income, and supply chain fill rate	The discount depth and frequency	• The retailers always profit from the high-shallow strategy because it delivers the best results. Different outcomes for supplier income and supply chain fill rate; this variation is impacted by retailer capacity and promotional activities.
Daniel A. Sheinin and Albert J. Della Bitta (Sheinin & Della Bitta, 2021)	Consumer reference prices	Frequency and depth of the price promotion	• The result shows that deep depth discounts produce lower reference prices than shallow depth discounts at high frequencies.

Consumers will benefit from reduced prices through competition, H. Huang et al. (2016) consider a pricing competition and cooperation problem in a two-echelon supply chain with one common manufacturer and duopoly retailers. Six decentralized game models are built to examine how pricing strategies (Bertrand and collusion) and

power structures (manufacturer-dominant, retailers-dominant, and non-dominant) affect the performance of supply chain members. The results demonstrate that whether the duopoly retailers benefit from their collusion behaviors depends on the power structures and the two parameters.

Yang and Zhou (2006) consider the pricing and quantity decisions of a two-echelon system with a manufacturer who supplies a single product to two competitive retailers. The two-echelon supply chain consists of a manufacturer acting as the leader and two competitive retailers acting as followers. The paper analyzes the effects of the duopolistic retailers' different competitive behaviors on the optimal decisions of the manufacturer and the duopolistic retailers themselves.

In implementing price reductions, retailers must consider the size of the discount or rebate and the frequency of the discount. Sivakumar (1996) developed a framework related to discounts and the frequency of discounts that affect the consumer's utility function of a brand that has low and high price characteristics. The scenarios considered by the researchers were high frequency and shallow price cuts, 20% price reduction with 40% promotion run in a period. Moderate frequency and moderate discount, 40% reduction in price with 20% promotion run in a period. Low frequency and a high price cut, 80% price reduction with 10% promotion run in a period.

Promotion is one of the factors that influence consumer decisions in shopping. Promotion is a stimulus or commercial cue that motivates consumers to make a purchase (Smith and Sinha 2000). Several researchers consider this stimulus to observe consumer behavior in shopping, Osborne (2018) states that the increase in the frequency of promotions does not have a significant impact on sales and revenue. This finding is different from Arvitrida et al. (2019) which examines the effect of price promotion on retailers who are competing by considering different consumer behavior. The researchers use an agent-based simulation approach to observe the interaction between agents in the simulation, namely retailers and customers. In price promotion, retailers apply a pricing strategy based on the frequency of promotions and the level of price discounts. Meanwhile, customers have certain purchasing preferences for functional products that are needed daily. In their research profit and sales are used to measure retailer performance.

Pramudita (2020) developed the research of Arvitrida et al. (2019) by taking into account the capacity limitations that have not been considered in previous studies. In addition, the researcher also studied the effect of different promotional strategies on profit, sales, and lost sales at retailers, supplier income, and supply chain fill rate on market demand. Furthermore, Sheinin and Della Bitta (2021) investigated the impact of varying frequency and depth of discounts on consumer reference prices from period to period. Where the reference price is the standard basis used by consumers in assessing the current price which can affect the value of the brand they feel. Several studies related to promotions that have been mentioned above have different results, this is because the research was conducted to determine the effect of frequency and depth price reduction on different focuses. A summary of several previous studies on retailer competition and customer preference is presented in Table 2.

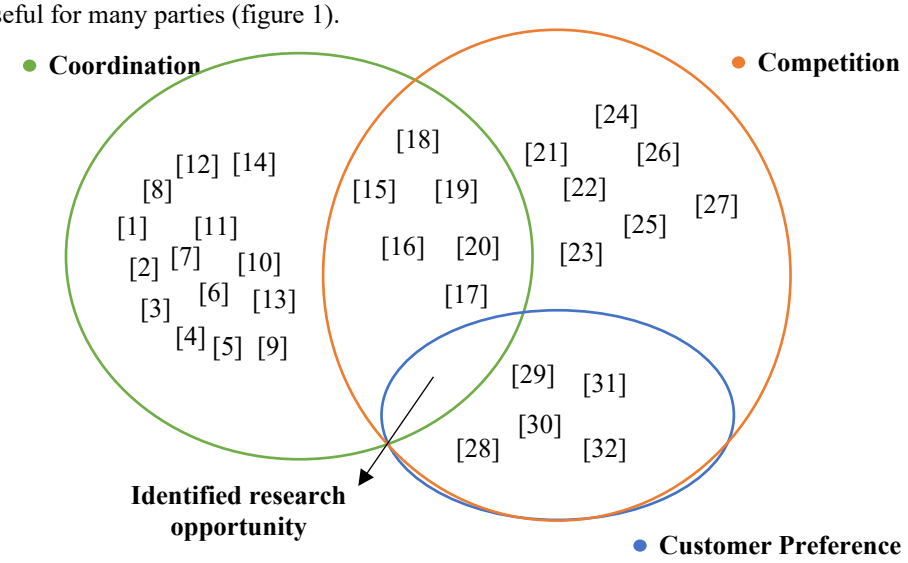
4. Analysis and Discussion

Research on supply chain coordination has been carried out by many previous researchers. The majority of researchers use quantity discounts as a coordination mechanism. This mechanism is considered capable of aligning incentives between supply chain members to increase the profits of the entire supply chain network. Some researchers also develop this condition when retailers are competing. Competition between retailers is unavoidable, especially when retailers are dealing with price-sensitive consumers. Therefore, several studies related to competition between retailers have developed by considering consumer behavior.

With this brief description, it can be mapped that the majority of research related to supply chain coordination develops by involving retailer competition factors, on the other hand, the majority of research related to retailer competition develops by adding consumer behavior factors. So it becomes an opportunity in the scientific field if the two topics are integrated and results are obtained regarding the effect of supply chain coordination on competing retailers where they have a target market that is sensitive to price changes. The results of the mapping related to research opportunities will be presented in Figure 1 below.

The mapping of research opportunities can provide initial identification for research in the supply chain field. This literature review and research opportunity paper make it easier for researchers to find research gaps and does not rule out the possibility that research in this area will develop further in the future by adding several factors that can be

considered such as capacity limits, joint lot sizing, and other related factors so that future research in This topic will be growing and useful for many parties (figure 1).



[1] Lee (2000)	[12] Venegas and Ventura (2018)	[23] Boatwright et al. (2004)
[2] Narayanan and Raman (2004)	[13] Yin et al. (2015)	[24] Das and Kumar (2009)
[3] Munson and Rosenblatt (2001)	[14] Zissis et al. (2015)	[25] H. Huang et al. (2016)
[4] Li and Liu (2006)	[15] Parthasarathi et al. (2011)	[26] Yang and Zhou (2006)
[5] Duan et al. (2010)	[16] David and Adida (2015)	[27] Sivakumar (1996)
[6] Chang et al. (2010)	[17] Chen and Xiao (2017)	[28] Smith and Sinha (2000)
[7] Heydari (2014)	[18] Hosseini-Motlagh et al. (2018)	[29] Osborne (2018)
[8] Huang et al. (2011)	[19] Ingene and Parry (1995)	[30] Arvitrida et al. (2019)
[9] Kamali et al. (2011)	[20] Xiao et al. (2007)	[31] Pramudita (2020)
[10] Nie and Du (2017)	[21] Fernie and Sparks (2014)	[32] Sheinin and Della Bitta (2021)
[11] Ponte et al. (2020)	[22] Pu et al. (2019)	

Figure 1. Research mapping and opportunity

5. Conclusion

Through the explanation in this paper, we get a sufficient initial description regarding the supply chain coordination literature review when retailers are competing. Through this paper, there are also research gaps that become opportunities for further research. Exploration studies were carried out by mapping the previous literature on two topics, namely supply chain coordination and retailer competition, and retailer competition through pricing strategy and customer preference. Research in this area will be further developed by considering several factors that have not been explored in this paper such as capacity limitations, joint lot sizing, and other related factors.

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