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Reposition Conflicting Partners under Inventory Risk

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Abstract

This study investigates the strategy for a business to compete with its partners. Differentiation is usually employed but the effectiveness becomes suspicious when risk is present. Given inventory risk and cost increasing under demand variability, various coordinated strategies are reached through product repositioning. When the product in a direct channel is cheaper and inferior than the product in an indirect channel, the direct channel is not competitive under forbearing strategy. When the product in a direct channel is more expensive and inferior than that in an indirect channel, the direct channel should exercise assistant strategy. For products are with high demand variability (e.g., luxury goods), the higher selling cost is existed, the higher price should be for low positioned products and the larger differentiation must be in both direct and retail channels. When the product in an indirect channel positions to 2/5 of the direct channel and the wholesale price is the sum of linear combinations of product differentiation, profits are all maximized.

Keywords: Business strategy, Channel conflict, Inventory risk, Product positioning.

Introduction

Sales increasing in smart is main objective of an enterprise, so more and more manufacturs open a direct channel to enlarge their market share. Therefore, the dual-channel model has been applied at present to a wide range of industries, such as HP (electronics), Mcirosoft games (games), FUJA (exercise), Harson (shoes), etc. Manufacturers opening a direct channel may lead to channel conflict with retailers because retailers shift from partners to rivals. For example, ACER gave up on-line shopping channel in many countries while they still run direct on-line sales in many other countries. To avoid such conflicts, manufacturers can produce another type of product through quality classification to generate product differentiation if they intend to open a direct channel to sell their products. McGuire and Staelin (1983) point out that product differentiation affect consumer choice of a distribution channel and highly differentiated products may become competitive when sold via dual channels. Ries and Trout (1972) indicate that positioning does not refer to the products themselves, but to the impression that the products leave to potential consumers or the feeling of the consumers toward the products.

When products are manufactured at one time and inventory is held in dual channels to cope with market demands, inventory risk may affect the product positioning of both parties. Dumrongsiri et al. (2008) point out that a retail channel may position products as high quality whereas the direct channel may position products as low quality when inventory risk is considered by the retail channel if manufacturers open a direct channel to compete with retailers.

We adopt the vertically differentiated model to study the effect of inventory risk on positioning by both parties during competition. Although previous literature related to channel conflict has considered inventory risk, these studies have been confined to the discussion of the price mechanism under a competitive market. The present study, however, focuses on strategies of product positioning and pricing policy adopted by both channels. A differentiation strategy is used to allow dual channels to coordinate and enable the entire supply chain to maximize profit.

Literature Review

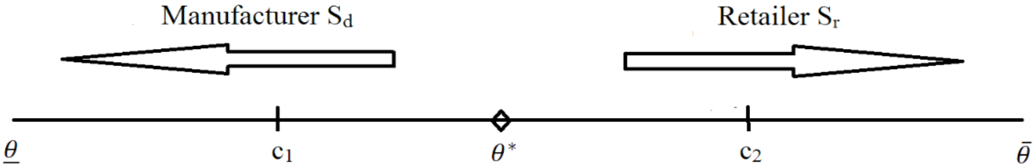
In recent years, numerous scholars have studied means to resolve channel conflict and reduce double marginalization. Cattani et al. (2006) point out that manufacturers, as pricing leaders (Stackelberg leader), should provide the price of direct channel approximates to the retail price of the retailers to alleviate channel conflict. This model adopts consumer utility theory. Yan and Pei (2009) find that during competition between channels, service differentiation can alleviate channel conflict and effectively enhance the performance of the entire supply chain. Improving retail service can also effectively protect traditional retailers from being marginalized. Khouja et al. (2010) point out that manufacturers may have a low-cost advantage when they choose a direct channel. The competition between a direct channel and a retail channel may effectively reduce double marginalization. Chun et al. (2011) reveal that manufacturers may increase their market share and profit accordingly, whereas retailers can be provided with a lower wholesale price when a direct channel is introduced by manufacturers. Dan et al. (2012) investigate retailer service and price differentiation. The analytical results indicate that retailer service significantly affect the pricing strategy. Applying different pricing strategies can effectively reduce channel conflict. Guangye et al. (2014) find that vertical and horizontal competitions in a distributed system frequently result in low efficiency in a channel. Dual channels can use a contract to maximize the profit of the entire supply chain and reduce conflict arising out of dual channels.

Studies on inventory risk and management in dual channels also have been conducted by numerous scholars. Chiang and Monahan (2005) posit that market demands are random in dual channels. However, consumers may probably turn to other channels in case of a product shortage in the aforementioned channels. Inventory holding cost and sales loss are then considered. The findings indicate that the dual channel strategy can meet the demands of consumers and expand market share in most cases. Yao et al. (2008) study the three types of inventory strategies for dual channels, namely, centralized inventory, Stackelberg inventory, and outsourcing inventory management work of a direct channel to a third-party logistics provider (3PL). The findings show that when the centralized strategy is adopted, the inventory held will be the largest, which indicates that it features the lowest shortage risk. As such, this strategy can provide the best service. An outsourcing strategy generally has more inventory than the Stackelberg strategy. According to Takahashi et al. (2011), manufacturers in dual channels may develop a new inventory control system that covers initial production to distribution for retailers/consumers.

Research Methods and Assumptions

When vertical differentiation exists in dual channels, consumer preference for quality is distributed evenly within [0,1], and $[\bar{\theta}, \underline{\theta}]$ is the quality range, where $\bar{\theta}$ denotes good quality and $\underline{\theta}$ indicates poor quality. Given that consumers have the same opinion regarding product quality, it's common that retailer quality is higher than manufacturer quality ($s_r > s_d$). The utility function by each consumer from each channel is as $u_i = v + \theta_i s_i - p_i$ *(i* $\in r, d$*)*. If $u_r = u_d$, θ^* is the indifference point which indicates that the consumer obtains no difference in utility at that point even if he/she buys the product from different firms. The product positioning of the manufacturer (s_d) approximates to $\underline{\theta}$. Thus, the product sold by the manufacturer is inferred to have poor quality. By contrast, the positioning direction of the retailer (s_r) is close to $\bar{\theta}$, and thus, the product sold by the retailer is inferred to have good quality. As shown in Figure 1, c_1 is closer to $\underline{\theta}$, hence, the consumer at this point prefers to buy products from the manufacturer. By contrast, the consumer at c_2 prefers to buy products from the retailer because this point it close to $\bar{\theta}$.

Figure 1. *Vertical Differentiation*

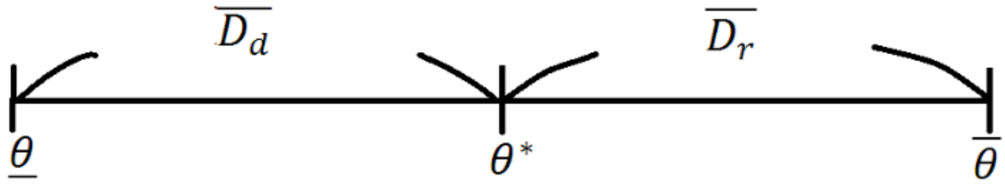


Source: Authors' estimations.

In utility function, θS_i (i∋r,d) indicates the gap between the ideal product of the consumers and the product that they have purchased. The assumption is that consumers are not confined to a retail or a direct channel, and thus, they can choose to buy products from another channel to prevent the entire market from being dominated by the manufacturer or the retailer.

We can also see that an indifference point θ^* exists in a linear market. The consumer at this point can obtain the same utility regardless of which firm he/she buys product from. In case of $u_r = u_d$, the position of the indifference point is given as $\theta^* = \frac{p_r - p_d}{s_r - s_d}$. Whenever $\theta^* < \theta_i$ indicates that a consumer tends to buy products via a retail channel, whereas $\theta^* > \theta_i$ indicates that a consumer tends to buy products through a direct channel. Therefore, the market demand of the retail channel $\overline{D_r}$ is that $\overline{D_r} = \frac{1}{\Delta\theta}(\bar{\theta} - \theta^*) = \frac{\bar{\theta}}{\Delta\theta} - \frac{p_r}{\Delta\theta\Delta s} + \frac{p_d}{\Delta\theta\Delta s}$ and the market demand of the direct channel $\overline{D_d}$is that $\overline{D_d} = \frac{1}{\Delta\theta}(\theta^* - \underline{\theta}) = \frac{\bar{\theta}}{\Delta\theta} + \frac{p_r}{\Delta\theta\Delta s} - \frac{p_d}{\Delta\theta\Delta s}$ (Figure 2).

Figure 2. *Market Demand in Vertical Differentiation*



Source: Authors' estimations.

We assume one time production in market such as cell phone market, so our research backround can be based on Newsvendor Theory. The retailer in a retail channel decides the retail price p_r and order quantity $q_r = z + \overline{D_r}$, where q_r denotes the order quantity from the retailer and z denotes a stochastic market demand which can be observed by transform equation to $z = q_r - \overline{D_r}$. The retailer purchases products at a wholesale price w (production cost is c_d), the unit sales cost of the product is c_r, h is the inventory holding cost, and π is the shortage cost. The manufacturer will sell products to consumers at the price of p_d via a direct channel and c_{ds} is the sales cost in the direct channel. Hence, the wholesale price has to be lower than the price in the direct channel ($w<p_d$) to prevent retailers from purchasing via the direct channel. Similar to the concept of the newsvendor model, the expected profit function of the manufacturer can be expressed as $\mathrm{E}[\Pi_d(p_d)] = (w - c_d)(\overline{D}_r + z) + (p_d - c_d - c_{ds})\overline{D}_d$ and also at the retailer side can be expressed as $\mathrm{E}[\Pi_r(z, p_r)] = (p_r - c_r - w)(\overline{D}_r + \mu) - (c_r + w + h)\,\eta(z) - (p_r + \pi - c_r - w)\lambda(z)$

. The expected excess inventory is expressed as $\eta(z) = \int_0^z (z - \mu)\, f(\mu)\mathrm{d}\mu$ and also the expected inventory shortage is expressed as $\lambda(z) = \int_z^1 (\mu - z)\, f(\mu)\,\mathrm{d}\mu$, and μ denotes the mean of stochastic market demand, and $[0,1]$ means in a linear market with the cumulative distribution demand function $D = F(d)$. Based on the decision of each party, z, p_r, p_d are partially integrated by the best response function and profit functions of both parties; then, we can use differential analysis in order to get the optimal order quantity $F(z^*) = \frac{p_r^* + \pi - (c_r + w)}{p_r^* + h + \pi}$, related price at the retailer $p_r^* = \frac{1}{2}(w + c_r + \bar{\theta}\Delta s + \Delta\theta\Delta s\mu) + \frac{p_d}{2} - \frac{\lambda(z)\Delta s\Delta\theta}{2}$, and related price $p_d^* = \frac{1}{2}(w + c_{ds} - \underline{\theta}\Delta s) + \frac{1}{2}p_r$.

According to above equations, an increase in retailer sales cost c_r, wholesale price w, inventory holding cost h or shortage cost π may cause a decrease in $F(z^*)$ from the retailer. We can easily understand the reason from p_r^* increasing which causes demand decrease. The interesting thing is that $\frac{\partial p_r^*}{\partial \lambda(z)} < 0$ which means inventory shortage at the retailer side may come from direct channel. We can also get the optimal prices through both p_r^* and p_d^* at $p_r^{**} = w + \frac{2}{3}(c_r + \bar{\theta}\Delta s + \Delta\theta\Delta s\mu) + \frac{1}{3}(c_{ds} - \underline{\theta}\Delta s) - \frac{2}{3}\lambda(z)\Delta s\Delta\theta$, $p_d^{**} = w + \frac{1}{3}(c_r + \bar{\theta}\Delta s + \Delta\theta\Delta s\mu) + \frac{2}{3}(c_{ds} - \underline{\theta}\Delta s) - \frac{1}{3}\lambda(z)\Delta s\Delta\theta$, and both also show negative effect with $\lambda(z)$.

Model Analysis

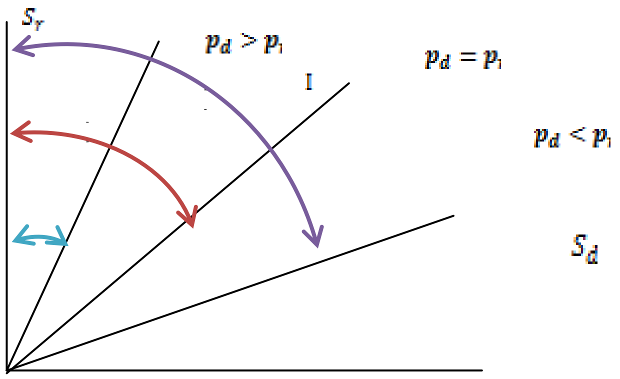
Strategy of the Manufacturer – Performed Under Different Market Demand after Opening a Direct Channel

When the manufacturer considers opening a direct channel, the pricing strategy of a direct channel is significantly related to product positioning and market demand in the dual-channel model.

Proposition 1: If $\frac{s_d}{s_r} > \frac{v - p_d}{v - p_r}$, then $\overline{D}_r + \overline{D}_d > \overline{D}_r^s$.

The aggregation of market demands is used to verify if $\overline{D}_r + \overline{D}_d$ is greater than the demand of the traditional channel $\overline{D}_r^s$ after a direct channel is opened by the manufacturer. Based on Proposition 1 and Figure 3, if the manufacturer positions a product of a direct channel to be higher than that of a retail channel $(S_r < S_d)$ and when $p_d < p_r$, then the total market demand of dual channels will be higher than that of the traditional channel (Zone I of Figure 3). If the price in a direct channel is higher than that in a retail channel$(p_d > p_r)$, and the retailer positions the product of a retail channel to be higher than that of a direct channel, then the total market demand of dual channels will be lower than that of the traditional channel market (Zone III of Figure 3). If the price in a direct channel is equal to that in a retail channel $(p_d = p_r)$, and the products of the retail and direct channels are positioned identically$(S_r = S_d)$, then the total market demand of dual channels will be equal to that of the traditional channel market (Zone II of Figure 3).

Figure 3. *Market Demand of Dual Channels*



Market Demand and Order Quantity under Inventory Risk

When the market demand is greater than order quantity, we will consider the effects of inventory risk and shortage risk on product positioning in direct and retail channels. The effects may vary under different conditions.

Lemma 1: $\frac{\partial \lambda(z)}{\partial z} < 0$ **and** $\mu - \lambda(z) \geq 0$

If more products are ordered, then shortage quantity will be smaller; if less products are ordered, then shortage quantity will be larger. The average market demand being greater than shortage quantity is deemed reasonable. If no product is ordered, then shortage quantity will be equal to the average market; if products are ordered, then market demand will be equal to the shortage quantity after the order quantity is deducted.

Optimal Product Positioning

In this study, optimal positioning is applied under dual channels to achieve maximum equilibrium between a direct channel and a retail channel. When inventory risk is considered, optimal order quality is used to meet market demand.

Proposition 2: If $s_d = \frac{2}{5}s_r$ **and** $F(z^*) = \frac{p_r^* + \pi - (c_r + w)}{p_r^* + h + \pi}$ can equal to order quantity of the retailer, then Max (Π_r+Π_d).

The products sold via manufacturer direct channel and retailer retail channel are positioned differently. The results indicate that the quality of the product sold via a direct channel differs from that sold through a retail channel, that is, the quality of the product sold via dual channels must follow the optimal product positioning $s_d = \frac{2}{5}s_r$ in order to maximum profit in dual channels.

Conclusions

Our analysis in this study is divided into three parts. The first part discusses the prerequisites that the manufacturer should consider when opening a direct channel. The second part analyzes the effect of inventory risk on the market demand and order quantity in dual channels. The third part explores optimal product positioning and maximum profit for retail and direct channels under the dual-channel model. For future studies that can focus on considering inventory risk in a direct channel and in a retail channel to further explore optimal inventory for each party under the dual-channel mode.

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