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E-Commerce Cooperation Strategy Research based on the Preference of Consumers

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Abstract: In this paper, on the basis of the classification of the market and customer, we set the basic assumptions of participant in the EC cooperation. We take some of the assumptions which were used to study grey marketing into the game analysis. And then, on the basis of the Hotelling model, we argue the cooperation strategy choice mechanism between electronic distributors and traditional distributors in the EC cooperation, explore the benefits and costs of all parties in the alliance, found that it can bring more profit and cost advantage of the alliance is an important factor to decide whether or not ally with each other.

Keyword: Buying Risk; Reliability; E-Commerce; Cooperation Strategy; Hotelling Model

1. Introduction

According to the report of CNNIC (China Internet Network Information Centre), till 2011, the number of internet user in China is more than 500 million and amount to 513 million. CN-based registration and the number of website amount to 3.53 million and 2.296 million respectively. As the world's biggest E-commercial market, the enormous amount of internet surfers in China is the excellent base for e-commerce activities. More and more customers choose the internet for shopping, among all customers in China, E-commerce customer amount to nearly 200 million.

With the great development of internet and

communication technology, the scale of E-commercial transaction increase yearly. E-commerce bring with it great economic increase and as well E-commerce play more and more important role in economic activities. Meanwhile, E-commerce inevitably face risks, it challenges traditional commercial activities, reshape the management and operation of enterprise and people's attitude as well.

The research of E-commerce firstly focuses on its concept, mode and model, then the selection of applied strategies and application of these strategies. Among them, the research of E-commerce strategies, particularly the channel strategies, mostly focus on the choice between traditional channel and E-commerce channel or the integration of multiple channels. In accordance with the research of Kumar (2006) from the angle of producer's strategies, he studied the reason and mechanism of the addition of e-commerce channel to traditional retail channel. Chiang (2003) indicates the application of e-commercial direct selling channel of suppliers can increase the profits of suppliers and decrease dual marginalization. Similarly, a lot of researchers suppose customers have a low utility estimation coefficient for e-commercial product, for instance, (Fruchter, 2005). Dumrong Siri A (2008) add demand uncertainty to Chiang's utility function to construct random demand function, then by using of newsboy model to analyze the effect of demand uncertainty on producer's choice of e-commerce direct selling and finally indicate a significant relationship

between demand uncertainty and e-commerce direct selling. Berstein (2008) indicates the necessity of application of e-commerce channel in context of oligopoly and further find out the combination of traditional channel and e-commerce channel can get a balanced channel structure. Cai G G (2011) researches the effect of channel structure on retailers and the whole channel. Huang W (2009) researches the pricing strategies of single enterprise that based on the addition of e-commerce channel to traditional channel and indicates mixed channel enterprise will take higher price on e-commerce channel to confront new enter enterprise. Khouja M (2010) subdivided customers into customers only consume in traditional channel and compound customers, and research the selection and coordination of three channels, namely, producer owned retailing channel, direct selling channel, and independent channel. Cao W (2010) studied channel decision problem in context of demand uncertainty by using of game theory and get the balanced channel structure.

According to above researches, in most situations, the application of e-commerce channel no matter for suppliers or retailers, go without saying will have a positive effect on the increase of competitive advantage.

Modern enterprise's success lies on a new cooperative relation evolved from antagonism and competition, sometimes we call it strategic alliance (Maloni and Benton, 1997). Cooperation relation is a kind of quantization commercial relation build on trust, openness, risk sharing and benefit sharing. Cooperation relation will bring more commercial benefits to partners than without such relation (Lambert, Emmelhainz & Gardner, 1996, 1999, 2004, 2006, 2008).

The research of this paper focus on whether or not the traditional distributors will cooperate or ally with e-commerce distributors when trying to enter e-commercial market or build self-owned

e-commercial distribution channel.

Whether in traditional commercial mode or e-commercial mode, due to different customer preference, customers will balance various preference and conflict. For instance, customer probably prefer high quality, low price product, actually, high quality product is always product of high price, so customer need to balance product quality and price they can pay. In e-commerce situation, customer preference may change due to the new transaction situation. For instance, when do online transaction, how can seller optimize online customer's concerned efficiency, low price, risks to attract more online purchasers is of vital importance for formulation of e-commercial strategies.

The author will subdivide the selling channel and customers in the second part and provide the basic hypothesis.

The third part of this paper will present the mechanism for formulation of cooperation strategies between traditional distributors and e-commerce distributors on the basis of hotelling model.

2. Market segmentation and basic Settings

With the increasing uncertainty and personalization of consumer demands, e-commerce markets are increasingly competitive. Consumers have risk preferences rather than rationality when they make decisions about buying goods or services. With different risk preferences and consumption strategies, consumers have different purchasing behaviors, and purchasing behaviors determine e-commerce strategies of companies.

Previous researchers, such as Smith Wendell (1956), Suzanne Donner (1992), Marcus, Claudio (1998), Verhoef PC and Donkers B (2001), Stanislav D. Dobrev (2007), Silvia Sonderegger (2011), and Feng Zhu and Marco Iansit (2012), have classified markets and consumers from different angles. This paper focuses on the distributor cooperation in the

e-commerce environment. Online shoppers enjoy lower price and higher efficiency brought by network channels, but they also face higher risks, such as fakes, discrepancies between expectation and reality, risks of payment, and price frauds. In contrast, traditional sales have lower risks in spite of higher prices. Therefore, this paper classifies consumers into two types based on their risk preferences: one prefers to spend more money and insists on traditional sales for security, and the other one likes the highly-efficient and less-expensive e-shopping.

In this study, we examine the alliance composed by traditional and electronic distributors. Assume that the traditional distributor can obtain a certain product with price advantage and sells it in traditional markets, while the electronic distributor only has the advantage of selling the product on the internet. In this case, the two types of consumers may change their choices. The former may become online shoppers because the electronic distributor joins in the alliance; and the latter may purchase from the traditional distributor for the similar reason.

Assume that the traditional distributor T and the electronic distributor E sell the same product and they build an independent alliance J (e.g.: a joint distributor), and prices of the product sold by T , E , and J are P_T , P_E , and P_J , respectively. Obviously, the price relationship is as follows: $P_E < P_J < P_T$.

To control other conditions, this paper supposes that products sold by both distributors are exactly the same without structural or functional difference and differences between traditional and e-commerce distributors are risks and prices during the purchase process. In this paper, the reliability of purchasing goods is set to R , which varies in different channels. The behavior of purchasing goods at a higher price through traditional distributors reflects that these consumers prefer to pursue reliability at a higher cost, lowering purchase risks; the behavior of purchasing

goods at a lower price through the network reflects that these consumers are risk-takers who prefer to save more money. Therefore, the former buyers are considered as the "risk avoidance" type, and the latter is the "risk preference" type (or less risk avoidance).

Here are the questions to be explored. Will traditional distributors ally with e-commerce distributors when they enter into the e-commerce market? If yes, what are consequences (consumer position and chances of survival in the alliance)?

3. The Estimating Models of E-commerce Cooperation

The electronic distributor E and the traditional distributor T possibly heading for the alliance. Intuitively, the reason of this alliance is adequate: On the one hand, from the interest of the traditional distributor T with resources of traditional channel, it has to maintain a low price of the commodity to compete with the electronic distributor which develops fast; Allying with electronic distributor can avoid such price war, at the same time make more practical interests. On the other hand, from the interest of the electronic distributor E which has advantage of electronic channel, it faces huge competing pressure from distributors of the same kind; however, allying with the traditional distributor can gain resources of particular products in competition, improving brand and scale of its own electronic channels, and a beneficial stance while competing with the distributors of the same kind.

Now, we will analysis the detailed mechanisms formulating these two main reasons.

① The willing and limits of alliance for the traditional distributor

In the analysis above, the electronic distributor E and traditional distributor T , separately has stable market position in electronic and traditional sales market. Now we assume that there is another traditional distributor T_1 beside T , and T_1 and T have the

same resource advantage in traditional channel market. The electronic distributor E frequently seeks opportunity allying with T or T_1 for its motivation to develop. Besides, the electronic distributor E has access to purchase similarly reliable products providing by T or T_1 in the market.

Under these assumptions, there are three distributors taking part into the competing game in the market: the electronic distributor E , the traditional distributor T and T_1 . The electronic distributor E has a stable stance in electronic sales market; but the traditional distributor T and T_1 will probably individually take half of the traditional sales market (if they are evenly matched). At this point, the traditional distributor T has several strategies to choose from as followed:

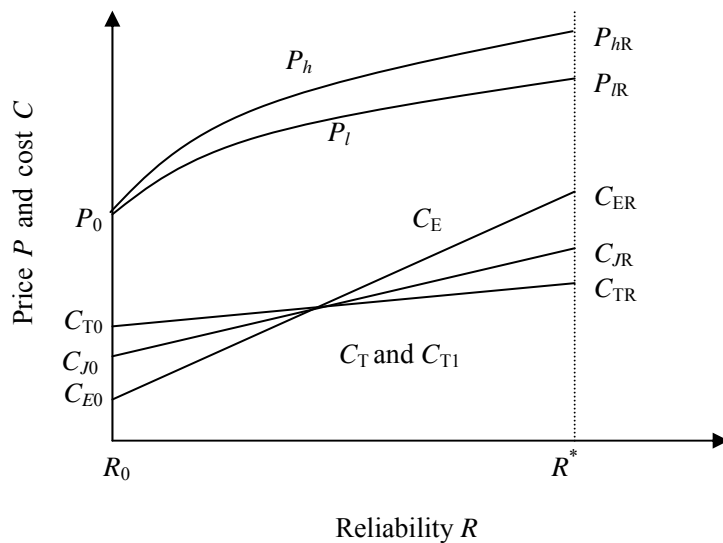
1) Do it alone

The traditional distributor T explores market alone, the environment of competition it may face are:

A. the traditional distributor T_1 and the electronic distributor E each explore the market alone

In this situation, the electronic distributor E occupies the electronic sales market, the traditional distributor T and T_1 divide the traditional sales market equally. The electronic distributor E imports products alone (from upstream market), which may lead to high-priced cost. It may be expelled from the market by T or T_1 using low price. So it is unbelievable threat.

B. the electronic distributor E and traditional distributor T_1 build strategic alliance J_1



Picture3.1 games between alliance and do alone

The cost that J_1 (may assumed as a joint venture or franchise) sells particular products lies between E and T selling the same products. Seemingly T could use low-price to expel J_1 from the electronic sales market. However, in fact, T_1 and E , which are the parent companies of J_1 , can obtain profits and opportunity of expanding scale from cooperation. There-

fore, driven by the benefit of parent company, J_1 has the possibility to exist.

Concretely, Picture 3.1 could be used to describe the condition of J_1 . As it shows in Picture 3.1, the horizontal axis represents reliability of purchasing products, and the vertical axis shows the price and cost. The traditional distributor T has a higher initial

cost, yet gets little increase on cost due to stable supply of goods when providing products through electronic market; The electronic distributor E has a comparatively low cost through electronic market, but it will has a surging cost if it sells new products which has no stable supply. In addition, consumers are divided into two parts: high risk aversion and low risk aversion. P_h curve in Picture 3.1 represents price curve of consumers who prefer to spend a higher cost (price) to get reliable guarantees; P_l curve is price curve of those who will pay less (lower prices) for equal reliability guarantees (Khai Sheang Lee, 2007).

According to the theory of Dunning (J. H. Dunning, 2001), it could save more transaction cost when transnational distributor increases the level of internalization. Hence, the cost that firms of alliance sale a certain product through traditional channel is higher than T , but lower than T when sale product through electronic channel due to the electronic distributor (here assumed that Along with the product purchase reliability reducing, the sales status of alliance tending to the electronic distributors' sales situation).

From Picture 3.1, relying on the cost advantage of highly internalization of individual proprietorship, the traditional distributor T can bring price down to $(C_{JR} - \epsilon)$ (ϵ is a small positive number), which could expel alliance J_1 which was established by the electronic distributor E and the traditional distributor T_1 from E-sales market. But it will be revenged by E and T_1 . On the one hand, the traditional distributor T_1 has the same cost curve as T , and it may merge J_1 when necessarily, falling into a cannibalization price war against T . It is mire which T and T_1 don't want to fall into. On the other hand, facing price attack of T and being unable to gain benefit from alliance, the electronic distributor E would protect t E-sales market, use the low-price of $(C_{F0} - \epsilon)$ to compete for customers against T , and give active support to T_1 to merge J_1 . Therefore, for a rational participator, it is unbe-

lievable threat that T provokes a cannibalization price war. On the contrary, on the condition of inexistence of a cannibalization price war, it is beneficial to all parties.

There is a question remaining, why T_1 want to ally with E , other than pursuing cost advantage of highly internalization of building individual proprietorship? We will leave the question to be settled in following text.

2) Ally with T_1

It will contribute to coordinate their behavior and avoid vicious competition when T and T_1 make an alliance organization. However, according to the current partition of the market, T and T_1 still share the traditional sales market.

3) Ally with the electronic distributor E

Explanation to the question also settles the remaining question above, which is why T_1 want to ally with E ?

To solve the question, Picture 3.2 is used to analyze market conditions. In Picture 3.1, the vertical axis represents price and cost, the horizontal axis represents performance of products. The difference between picture 3.2 and picture 3.1 is the meaning of the horizontal axis, the purpose of doing that is convenient to further divided the customers.

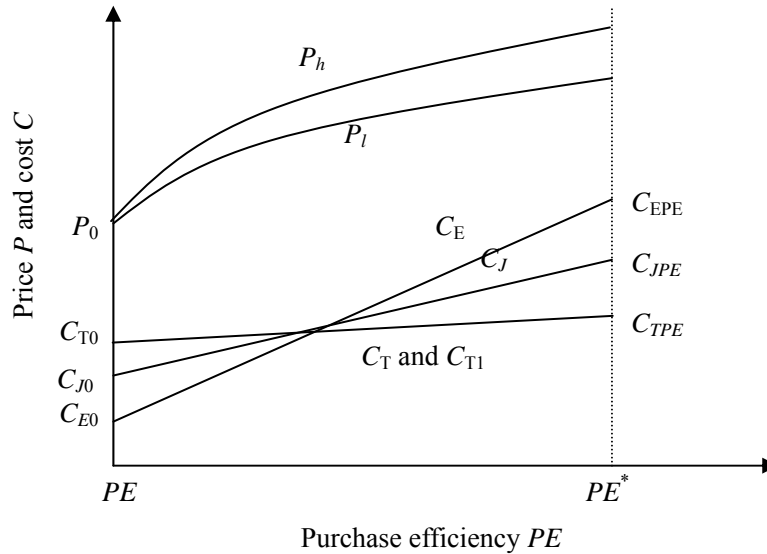
As shown in the picture 3.2, when the cooperation project has both market potential and profits space, on one hand, the potential customers are enough; on the other hand, the price curve (P_h and P_l) lies above the cost curve (C_E , C_J , C_T and C_{T1}), we can subdivide the customers according to the interactive relationship between distributors and the customers. Table 3.2 shows four typical customer types.

In table 3.1, type I customer would pay higher price for the pursuit of high purchasing efficiency, and its low risk aversion characteristics, making it does not pay attention to the reliability of the purchase. Hence he is the relier of the traditional distributor that we discuss in this paper. The reason why he

buys products from joint venture or other forms alliance is his trust towards the traditional distributor. Type II customer also pursues high purchasing efficiency, but they have high reliability requirement, in order to avoid the risk of purchase. Type III customer doesn't pursue high purchasing efficiency, However, because of low risk aversion, the price has significant effects on his purchase behavior. He always expects to gain higher purchasing efficiency with lower price. Type IV also doesn't pursue high purchasing efficiency, but its high risk aversion characteristics, making it pay more attention to the reliability of the purchase. Hence he is the relier of the electronic distributor that we discuss in this paper. The reason why he buys products from joint venture or other forms alliance is his trust towards the electronic distributor.

type I and type IV consumer are stable relier for traditional distributor and Electronic distributor accordingly, so, the competition between distributors, in essence is the pursuit of type II and type III producer. In fact, the four types of consumer is barely one abstract of the real consumer and it can regarded as four types of typical representations of the real distributors, and the real distributors can be one type of them or the combination of any type of them. So, regarded the type II and type III consumers pursuit by distributors, we can imagine their characteristics to be very complicate. For instance, in "risk averse" degree, there may have many states from high to low; in the reliability of purchase, may also have many states from high to low. In this way, we can use the following method to analyses.

According to situation mentioned above, for



Picture 3.2 classification of consumers

Table 3.1 typical type of potential customers

	Low risk aversion	High risk aversion
High purchasing efficiency	I	II
Low purchasing efficiency	III	IV

In order to compare different situations, we first analyze the situation without alliance. Suppose there

is a products which can be sold through traditional channel and electronic channel, the probability of risk

that the consumers purchase products from T and T1 are f_T , the probability of risk that the consumers purchase products from E is f_E . Do not lose the generality, suppose $f_T=0, 0 < f_E < 1$; The loss of consumer is W . We suppose consumers' preference of purchasing reliability distributed evenly in $[0, f_E]$, if we suppose there is no difference between consumers' purchase of products from T(T1) or E, and the preference of purchasing reliability of consumers is

$$f = f^*, 0 \leq f^* \leq f_E,$$

So,

$$(f_E - f^*)W + P_E = P_T \tag{3.1}$$

We can explain the meaning of equation (3.1) as follows: on the left side of the equation is the purchaser surplus decrease due to consumer purchase products through electronic channel ($f = f_E$) compared to $f = f^* < f_E$, however, we omit the purchasing product price when $f = f^*$, on the right side of the equation is the purchaser surplus decrease caused by consumer purchase products through traditional channel ($f = f_T = 0$) rather than $f = f^*$, we omit the product price when purchase $f = f^*$ as well. On base of equation (3.1), we conclude

$$f^* = f_E - \frac{P_T - P_E}{W} \tag{3.2}$$

Obviously, if the consumer's require of purchasing reliability is $f < f^*$, the optional purchase object is the product sold by T or T1. Suppose $f_M \geq f_E$ is the maximum the probability of risk accepted by consumer, so, any consumer can only purchase products in the range of $[0, f_M]$, otherwise there is no corresponding consumer. Obviously, for consumer require the probability of risk is $f^* < f \leq f_M$, the optional purchase object is the product sold by E. So, the question we researched is just a price question by Hotelling price game theory.

According to that, we generalize the distribution proposition in equation (3.1), that is, consumer's preference of purchasing reliability distributed evenly in range of $[0, f_M]$, so, the profit of E is

$$\pi_E = (P_E - C_E) \frac{f_M - f^*}{f_M} \tag{3.3}$$

The total profit of the firm who sale products through traditional channel (including T and T1) are:

$$\pi_{2T} = (P_T - C_T) \frac{f^*}{f_M} \tag{3.4}$$

Put equation (3.2) into equation (3.3) and equation (3.4), we get the first order condition of profits maximum

$$\frac{\partial \pi_E}{\partial P_E} = \frac{1}{f_M W} (f_M W - f_E W + P_T - 2P_E + C_E) = 0 \tag{3.5}$$

$$\frac{\partial \pi_{2T}}{\partial P_T} = \frac{1}{f_M W} (f_E W - 2P_T + P_E + C_T) = 0 \tag{3.6}$$

Solve equation (3.5) and (3.6); we get the Nash equilibrium price

$$P_E^m = \frac{1}{3} ((2f_M - f_E)W + C_T + 2C_E) \tag{3.7}$$

$$P_T^m = \frac{1}{3} ((f_M - f_E)W + 2C_T + C_E) \tag{3.8}$$

Put equation (3.7) and (3.8) to equation (3.3) and (3.4) respectively, consolidate that with equation (3.2), we get the profits under equilibrium condition:

$$\pi_E^m = \frac{1}{9 f_M W} (2 f_M W - f_E W + C_T - C_E)^2 \tag{3.9}$$

$$\pi_{2T}^m = \frac{1}{9 f_M W} (f_M W + f_E W - C_T + C_E)^2 \tag{3.10}$$

So, under the proposition of evenly distributed the probability of risk of consumer, both profits of traditional distributor and electronic distributor are less than zero. Among them, equation(3.10)is the mutual profits of traditional distributor T and T1, due to the same situation of T and T1, any consumer make no difference purchase between T and T1, thus, we can conclude the equilibrium profits of T equals to that of T1, that is

$$\pi_T^m = \pi_{T1}^m = \frac{1}{2} \pi_{2T}^m = \frac{1}{18 f_M W} (f_M W + f_E W - C_T + C_E)^2 \tag{3.11}$$

In above analysis, equilibrium price equation (3.7) and (3.8) identify, the higher the probability of risk f_E of electronic distributor, the lower the equilibrium price P_E^m , and the higher equilibrium price of traditional distributor's product. It is asserted keep other conditions unchanged, the higher the probability of risk of electronic distributor, the more detrimental to electronic distributor's market place keeping, on the contrary, strengthen their counterparty's market position. This conclusion conforms to our intuition. In fact, from equilibrium profit equation (3.9) and (3.10) we can get the similar conclusion: the higher the probability of risk of electronic distributor f_E , the lower the profit π_L^m , however, the competitor's (traditional distributor) profits π_F^m becomes higher. Secondly, if market demand-based maximum probability of risk f_M increases, all consumers benefit, it indicates market condition relaxing is beneficial to all manufacturer; Thirdly, consumers' profits are negatively related to its costs, while positively related to competitor's costs.

Now, we study the situation that T and E establish an alliance. Here, we regard the alliance between T and E as an independent enterprise J; we conduct Hotelling price game theory analysis to J and T1. Thus, we deal with research questions with the same methods used above. Suppose the probability of risk of alliance enterprise J's products satisfy following conditions: $0 = f_{T1} < f_J \leq f_E \leq f_M$, f_n is the probability of risk of T1, accordance with Hotelling price theory, the equilibrium product price of enterprise J is

$$P_J^m = \frac{1}{3} ((2f_M - f_J)W + C_{T1} + 2C_J) \tag{3.12}$$

Equilibrium price of traditional distributor's (ventures exclusively with the high-end investment)

product is

$$P_{T1}^m = \frac{1}{3} ((f_M + f_J)W + 2C_{T1} + C_J) \tag{3.13}$$

In the above two equations, CT1 is unit cost of product in T1, CJ is the unit cost of J's product. We can see equation (3.12) and (3.13) respectively analogous to equation (3.7) and (3.9). The Nash equilibrium price of T1 and J by Hotelling model analysis is:

$$\pi_J^m = \frac{1}{9 f_M W} (2 f_M W - f_J W + C_{T1} - C_J)^2 \tag{3.14}$$

$$\pi_{T1}^m = \frac{1}{9 f_M W} (f_M W + f_J W - C_{T1} + C_J)^2 \tag{3.15}$$

In the above two equations, π_J^m is alliance J's profits, π_{T1}^m is traditional distributor T1's profits, the structure as well analogous to equation (3.9) and (3.10).

Now the question is: how electronic distributors E and traditional distributors T to allocate alliance profits π_J^m . For convenience, here using "profitability" as criteria (Guidelines of the "profitability" is one of the common assumption of the distribution of benefits of the alliance, the actual principle of interests distribution of the alliance is often just close to these guidelines, or criteria; In addition, environmental change, organizational culture and characteristics of decision-makers will have an impact on the distribution of benefits) to divide the alliance gains (Farok Contractor and Wonchan Ra, 2000). According to this rule, the share of the profits of one partners of alliance depends on the ratio of its own profit ability in total profit ability. Therefore, the profits that electronic distributors get from the alliance are:

$$\pi_{JL} = \frac{\pi_L^m}{\pi_L^m + \pi_F^m} \pi_J^m \tag{3.16}$$

And the profits that traditional distributors get from the alliance are:

$$\pi_{JF} = \frac{\pi_F^m}{\pi_L^m + \pi_F^m} \pi_J^m \quad (3.17)$$

The above two equations are determined by (3.11) and (3.9).

In the above analysis, the profit value, such as equation (3.9), equation (3.10) (3.11) and (3.14) (3.15) and (3.16) and (3.17). Show that the profits not only related to the product failure rate of competitive parties, but also more sensitive to differences of the cost; For example, the difference between CF and CL in equation (3.9) and the difference between CF1 and CJ in equation (3.14) have a greater impact on profits. Therefore, it can bring the cost advantage is the important factors to decide whether ally with each other or not.

Above result of cooperative or uncooperative Hotelling price competition game between traditional distributors and electronic distributors indicate that, there may be "win-win" alliance program which beneficial to both partners.

4. Conclusion

This study focused on EC cooperation strategy, trying to answer under what conditions the alliance between traditional distributors and electronic distributors can exist and how to achieve "win-win".

Usually electronic distributors and traditional distributors can coexist in the same product sales market, but, electronic distributors lack of stable and reliable product source, they can only to take consumer who have the low risk aversion as target customers, while traditional distributors take the consumer who have the high risk aversion to purchase the same kind of good products as target customers. Under the premise of the market segmentation, electronic distributors and traditional distributors make competition and cooperation in the E-sales market, the traditional distributors who take advantage of resources tend to choose to enter the market by means

of ally with the electronic distributors. Traditional distributors enter into the electronic sales through cooperation with the traditional distributors; with relatively low cost opened the electronic sales market. And electronic distributors ally with the traditional distributors, although the competition may aggravate, but really get a stable source of product, reduce the cost and improve the profit, and also may improve its original electronic sales network scale and brand effect.

To analyze the specific mechanism of alliance cooperation, on the basis of Hotelling price competition game between traditional distributors and electronic distributors, we argue the cooperation strategy choice mechanism between electronic distributors and traditional distributors in the EC cooperation, explore the benefits and costs of all parties in the alliance, found that it can bring more profit and cost advantage of the alliance is an important factor to decide whether or not ally with each other.

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