Research on the Game between Network Operators and Agents in the Electronic Commerce Environment

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Abstract

This article based on the construction of network operators and agents of the profit function, by solving the profits curve model, push derived operators and agents cooperate with each other the preference intervals to determine network operators and agents market accounted for the proportion of the best cooperation, to reduce and avoid network industry channel conflict, provide theoretical support to realize network operators and agents of mutual benefit and win-win goals.

Keywords: Operators, Agent, Game Model

1. INTRODUCTION

Along with the rapid development of our economical society, continuous development of the network industry, increasing homogenization of products and services provided by network operators, the challenge operators are facing is more and more big, the theme of the competition gradually from the price leading to the industry chain and marketing network oriented transition, industry competition from the size of the network coverage, number of users, the business types and operation modes of competition and development to today’s channel resource competition. Channels have become important resource and the means of competition in the development of the network industry, an indispensable and important channel will connect the network enterprise and customer, with expanding market and information feedback, also influence the realization of enterprise strategy and business goal. With the evolution of marketing channel theory, scholars have shifted focus channel structure to channel conflict and channel behavior. Conflict management of channel has been increasingly important, a how to resolve channel conflict and realize a win-win goal has become interest and need of stakeholders. Channel power is the most important part of channel behavior, and their research is mainly concentrated on the developed market economies. As for channel power, related theory especially industry-specific empirical research is still inadequate and more theoretical research-based. Based on research paradigm of conflict game of telecom operators and agents in telecommunications industry, the relation between the use of power of operator channel and a sense of credibility of agents is studied, which is used to compensate for the lack of studies in this field, creating theoretical and practical significance. Meanwhile, this study bases on channel power transfer, which features the characteristics of times.

After the third restructuring of telecommunications, 3G license issuance as well as incoming 4G issuance, the telecommunications industry structure is expected to be optimized and the market competition among operators will be more intense. Each operator tends to place distribution of marketing channels as well as governance channel relationships in a critical position, where channel satisfaction is an important goal of channel relationship management. Operators should establish awareness that channel satisfaction is able to promote channel performance and further customer’s satisfaction, focusing on building long-term stability, mutual benefit and ecological channel relationships.

For the Internet industry, operators, agents and consumers constitute a typical distribution system. The agents, in the middle position of the behavior, affect the size of the operator’s market competitiveness. Therefore, it’s the key to the operators to establish a set of reasonable layout, rapid response, strong competitiveness, high loyalty marketing channel system, so that can effectively resist the changes in market environment. To give full play to
the advantages of the channel, operators will undoubtedly focus on the work of the channel, only to stimulate the enthusiasm of the agent, the efficiency of the whole channel can be effectively improved. At the same time, due to the different starting point of interest, the conflict between network operators and agents is becoming more and more prominent. In some places, some of the agents on the accumulation of resources and distribution of the set of cards in the local network market set the price of chaos, led to a series of issues such as the lack of resources and customer complaints and customer complaints. For similar to Sunning, Dixon, a group itself has considerable strength and the right of discourse in large chain retailers, operators past treated scattered social channels (or non-owned channels) has already no longer suitable, agents in the two sides of the game gradually occupied the certain bit. How to control and manage the agents, it has become an important issue that cannot be avoided, so that their behavior in line with the overall interests of network operators. Based on that, by consideration of practice, the influence of inner agent on channel operation is further studied. From the prospective of long-term motivation, profitability of inner agent mechanism is constructed. Through adding long-term motivation constraints, discount rate, earnings rate, long-term motivation model is developed.

This article is writing by determining the network operators and agents of the market share ratio, according to operators and agents of their resources to coordinate and maximize ease network industry channel conflict, to ensure the efficient and healthy operation of business network channels, and get win-win effect.

2. THE RELATED CONNOTATION OF CHANNEL CONFLICT

"Channels" from the English "Channel", channels in this article means "Channel Marketing" in the marketing channels, also be known as the distribution channel "Channel Distribution". In the buyer’s market environment, the channel as a product or service and the carrier between the consumers, is the link between the operator and the customer’s bridge, directly related to the image of the operator. In most cases, due to the constraints of time, geographical conditions, consumers are unlikely to sold directly to manufacturers, the channel is sending the appropriate products to the appropriate location, at the appropriate time, convenient for consumers to buy. Therefore, the marketing channel is a set of interdependent organizations that make the products or services to be used or consumed successfully. And producers for their products will be sold to the user in the end, sold directly to the user or with all perform different functions and has the name of a different marketing intermediaries, these intermediate organizations composed of marketing channels.

Marketing scholars recognized that marketing theory from economics, where economics is the father of marketing (Philip Kotler). Similarly, the theory origin and the analysis method of the marketing channel also come from the economics originally. Marketing channel is a kind of goods or services from the producer to the consumer when moving, to obtain the ownership of the goods or services or to help transfer their ownership of all enterprises or individuals (Lu and Tang, 2015) (Philip Kotler). Simply said, the marketing channel is the specific channel or path of the transfer of goods and services from the producer to the consumer. Marketing channels are a series of interdependent organizations that are committed to making a product or service that can be used and consumed.

At present, there are two aspects to the research of channel theory. One is the structure, relationship and behavior analysis of channel and the two is the research of channel conflict and coordination mechanism.

Research on marketing channel theory has a long history. Ping Jun Lu, Xiao Fei Tang borrows the citation research method for quantitative analysis of the development trend of the research of marketing channel and the evolution of track, and reveals the issues in quite a long time in the future, channel relationship, the online channel, channel management and channel conflict will be the new hot (Lu and Tang, 2015). Shao Chang, Jiang Qingyun on the analysis of the existing channel theory "second stage three paradigm" (efficiency paradigm, power paradigm and the paradigm of the relation between) on the basis, the introduction of "knowledge flow" new channel flow concept, and combining the 4C marketing channel evolution framework, that the relationship between channel members is turning into a "based on the relationship of knowledge, and puts forward a new channel theory paradigm, channel learning paradigm (Shao and Jiang, 2011). Guijun Zhuang bases on transaction management property, authority and incentive three dimensions as a link, the link channel management strategy and the organizational form of the channel, and discusses the relationship between the two and construct a for channel management strategy selection based on the organizational form of the channel model (Zhuang, 2013). There are also some scholars have studied the network channel. Youguo Jing, Yanglu and so on, using dynamic game theory were established proxy channel network centralized decision-making model, business into contract model and based on business is divided into and effort cost sharing contract model combined (Jing et al., 2016). Donglin, Dong Tianli for network operators in China marketing channel
management were studied analysis the problems of network operators of the existing marketing channels, and proposes that we should strengthen channel coordination, coordination of channel conflict, clear channel positioning, the establishment of differentiated channel system and corresponding solutions and countermeasures (Dong et al., 2011). F. Watson IV Stefan, Worm George and some others have a comprehensive review of marketing channels for of 1980 to 2014, the marketing channel has been studied, and proposed a multi-dimensional view of the marketing channel (George et al., 2016).

Study on channel conflict and coordination, main focus on understanding of channel conflict coordination mechanism and challenges correctly, and put forward a status quo. Hole Lingyi describes the status quo and problems of the Internet marketing channel conflict management, emphasize the operators must to plan channel conflict management, to understand the marketing channel conflict constructive functions (Kong, 2010). Wang Zhiwei, Jiang Chuanhai has a base price of coordinated leadership on channel conflicts and producers in the single entity channel retailer how to use longitudinal constraint contract to achieve channel conflict (Wang et al., 2015). Zheng Xingyou, Zhang Aitian studied the competition and cooperation between network operators and agents, putting forward the view that the long-term interests of the meshing mechanism should be established, with the emphasis on the maintenance, the quality of the user, the user payment area around the user make channel policy and establish corresponding incentive system, let the network operators and agents to form a long-term common development and common benefit situation (Zheng and Zhang, 2012). Kuo-Hsiung Chang1, Donald f. gotcher research to explore the channel members can be used to coordinate the conflict of learning (CCL), as a conflict resolution mechanism, improve the channel capacity, so as to improve the marketing channel members’ work together to create value (Chang and Gotcher, 2010). Gangshu (George) Cai studied on the channel structure and channel coordination effects on suppliers, retailers and the entire supply chain in dual channel and dual channel supply chain background (Cai, 2010). Ruiliang Yan, Zhi Pei proposed a three cooperation strategy to solve channel conflict, improve the performance of channel members (Yan et al., 2016).

Network industry channel’s conflict is a conflict of interest, regardless of the network operators not to let their own stores agent business of other network operators are not even allowed to agents of their own initiatives of other network operators business agent or in regional continuous battle between the agents, in order to seize market share, maintain competitive advantage, fight for control of the marketing channel and cause. Generally speaking, network industry channel conflict is limited to refers to the vertical channel conflict, is a marketing channel in between the different levels of operators and agents of conflict, rather than horizontal channel relationship in (the same channels agents and between agents) conflict. Vertical channel conflict is important because for network operators and agents, these conflicts not only often occur and through the mediation of the conflict can better meet the needs of the consumers, so as to improve the competition strength of enterprise network. At the same time, good longitudinal channels are a smooth channel and effective operation of the premise, but the relationship depends on the behavior of both operators and agents (including solving conflicts and conflict).

3.CHANNEL CONFLICT RELATED NETWORK OPERATORS AND AGENTS OF THE PROFIT FUNCTION

Channel conflict in the network industry is not only due to the interests of the operators and agents, but also under the pressure of strong market competition. Assumed network market business demand function is linear relationship: \( Q = a - bP_2 \) (a, b for constant, and a>0, b>0), Q represents the market sales network business, \( P_2 \) represents the prices that agents will sell network business to consumer, which is the decision variables of the agents.

Thus, the profit \( \pi_1 \) of network operators can be defined as follows.

\[
\pi_1 = \lambda (P_2 - P_1 - C_2)Q + (P_1 - C_1)Q
\]  (1)

The profit of network agents is presented as the function (2).

\[
\pi_2 = (1 - \lambda)(P_2 - P_1 - C_2)Q
\]  (2)
In the equations (1) and (2), \( \lambda(\lambda \in [0,1]) \) represents the distributed profit rate of operators got from network agents’ marketing sales and \((1-\lambda)\) indicates the distributed profit rate of network agents. At the same time, \( P_1 \) is the decision variable of network operators, representing the price of network services at which the operators sell to agents. Furthermore, \( C_1 \) and \( C_2 \) denote business cost of network operators and unit sales cost of network services respectively.

In equations (1) and (2), \( \lambda \) is the direct factor affected the marketing share between network operators and agents. There exist two extreme circumstances. One the one hand, when \( \lambda=0 \) that means network operators get zero profit and agents get all the sales profits, the profit of network operators can be represented as: \( \pi_1=(P_1-C_1)Q \) while network agents can have \( \pi_2=(P_2-P_1-C_2)Q \) profits. On the other hand, when \( \lambda=1 \) that means network operators sell their products and services by their own channel and take up all the sales profits, the profits of network operators can be shown as: \( \pi_1=(P_2-C_2-C_1)Q \). In this case, getting zero profit, the network agents quit the market and the unit sales cost \( C_2 \) of network services become sales cost of the operators.

During the network marketing transaction, the network agents should make equation \( \partial \pi_2/\partial P_2=0 \) that means \( \partial[(1-\lambda)(P_2-P_1-C_2)Q]/\partial P_2=0 \) be real, if they want to achieve their maximum profits. Thus, considering the equation \( Q=a-bP_2 \), the equation (3) can be derived.

\[
P_2 = \frac{a + b(P_1 + C_2)}{2b}
\]

At the same time, the network operator must achieve \( \partial \pi_1/\partial P_1=0 \) for making the profits maximized, which means \( \partial[\lambda(P_2-P_1-C_2)Q+(P_1-P_1)Q]/\partial P_1=0 \). And given the equation (3), the following equations can be defined.

\[
P_2 = \frac{(3-2\lambda)a + b(C_1 + C_2)}{2(2-\lambda)b}
\]

\[
P_1 = \frac{(1-\lambda)a + b[C_1 - (1-\lambda)C_2]}{(2-\lambda)b}
\]

According to the equations above, the profit functions of network operators and agents can be shown as follows.

\[
\pi_2 = \frac{(1-\lambda)[a - b(C_1 + C_2)]^2}{4b(2-\lambda)^2}
\]

\[
\pi_1 = \frac{[a - b(C_1 + C_2)]^2}{4b(2-\lambda)}
\]

Superstition was with me at that moment; but it was not yet her hour for complete victory: my blood was still warm; the mood of the revolting slave was still bracing me with its bitter vigour; I had to stem a rapid rush of retrospective thought before I quailed to the dismal present.

4. PREFERENCES FOR NETWORK OPERATORS AND AGENTS TO COOPERATE WITH EACH OTHER

The marketing channel system of the network industry is influenced by its origin, structure and the influence of the market policy in different periods. The possibility of the channel form, the level and the members are more likely to be in conflict. Each channel member is pursuing the maximization of individual interests, which leads to the differences in the objectives of each channel member. Network operators often want downstream agents is not only sales of their products, but also provide to meet the requirements of the enterprise’s own a series of sales service, agents complained that operators not add investment to these new needs and provide appropriate
training. There are network operators to implement special policies in some special areas, but did not explain and communicate among the members of each channel, so that some channel members do not understand, these are easily prone to channel conflict.

The network operators and agents of the profit function is derived, assuming that all market network business is purchase at the price of P2 from the agent, through changes in the profit distribution coefficient to determine the cooperation between operators and agents. To clearly describe the profits of both operators and agents with divided into the proportion of variation curve and design \([a-b(C_1+C_2)^2]/4b=R\) (and apparently constant), and the profit function (6) and (7) start stop function at the point of value and the variation of the list as follows:

Table 1 The profit curve of network operators and agents

<table>
<thead>
<tr>
<th>Function expression</th>
<th>(\lambda=0)</th>
<th>(\lambda=1)</th>
<th>First order derivative</th>
<th>The two order derivative</th>
<th>Monotone property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator profit</td>
<td>(\pi_1=R/(2-\lambda))</td>
<td>(\pi_1'=R/2)</td>
<td>(\pi_1'=R)</td>
<td>(R/(2-\lambda)^2)</td>
<td>2(R/(2-\lambda)^2)</td>
</tr>
<tr>
<td>Agent profit</td>
<td>(\pi_2=(1-\lambda)R/(2-\lambda)^2)</td>
<td>(\pi_2'=R/4)</td>
<td>(\pi_2'=0)</td>
<td>(-\lambda R/(2-\lambda)^2)</td>
<td>(-2(1+\lambda)R/(2-\lambda)^2)</td>
</tr>
</tbody>
</table>

Figure 1. Network operators and agents with the market share of the profit curve

According to the data in the table, take \(R/4\) to the longitudinal axis of the unit, which can show network operators and agents of their profits changes with the market accounted for in the Figure 1:

We can see from Figure 1, network operators with profit sharing ratio increased, but in regions close to 0 rate of increase are far less than that in the regions close to 1 rate of increase significantly. On the operators’ profit curve, can always find a point, the prior to the increase rate is lower than the average, after this point increase at a rate higher than the average value, and this increase the speed is exactly equal to the average increase rate, also the network operators of the critical point of preference. For the same profit allocation of incremental (i.e., market share than the incremental), profit increment in different regions has a significant difference, so operators are expected to profit sharing ratio of the higher the better. But in reality, the network operators cannot fully occupy the channel profit, only to be significantly increase their profits in a range of cooperation with the agents to expand. For network operators, this preference is interval profit increase rate higher than the average value \((\lambda*, 1)\).

Network agents profit change curve in Figure 1 shows a decreasing trend, its profit is to reduce with the increase of operators” in the proportion, the more close to 1 of the regional profit reduction rate is reducing more significant. In the agent profit change curve, also can find a point, making the point of profit reduction rate is equal to the average value, that is, the existence of the critical point \(\lambda^*\) of preference of agents. In spite of the fact that the network agents want to share the profits to be the better, but the reality of the operators to control a high proportion of the market, agents can only choose their preferred range and operators to cooperate. For the network of agents, the same market account increment can bring more profit increment interval preference is with the operators, which is divided into the proportion of the increase rate was not the part of the interval and its profit cut \((0, \lambda^*)\).
4. NETWORK OPERATORS AND AGENTS MARKET SHARE OF COOPERATION

A lot of business in the network market is realized through social channels, so that a close relationship between network operators and agents is formed. Operators and agents are rational economic people, have the desire to maximize their own interests and rights, their behavior, whether it is competition or cooperation, is the result of interest oriented. Network operators to undertake the great business development costs and the risk of brand promotion cost, the pursuit of the goal is scale benefit and the long-term benefit, so pay attention to the brand of persistence and brand asset accumulation, hope to expand the market to do so for a long time, can have long-term cooperation and growth. Relatively speaking, the agency only assume lower marketing costs and the break point is low, to supply the choice, so often do not focus on customer service and the interests of consumers tend to in the pursuit of immediate short-term interests, ignore the establishment of long-term relationship. At the same time, the agency is not responsibility, obligation and cannot cooperate with the realization of the interests of operators target at the expense of their own interests, on the contrary, they sometimes will flee the goods by the defects of market information resources and market operator strategy, low sales promotion as well as sets of cards.

Although the pursuit of short-term interests of the network agents does not mean refusing the long-term interests, but the short-term interests of the guiding behavior will lead to the network industry channel conflict. Due to the intensification of market competition, channel distributor and dealer between horizontal conflicts (CTS) occur frequently and eventually lead to vertical conflict between network operators and agents. The serious consequences of the channel conflict will make the market price system disorder, the impact of corporate brands. Therefore, in the marketing channels establishment, to determine a reasonable network operators and agents of the market accounted for the ratio, or prevent in time to stop the occurrence of conflict and competition, to maintain a stable and healthy development of channels has become the important task of network operators, marketing management.

According to the Lagrange mean value theorem [if the function can be on the upper continuous, then there must be one, so that.] For the network operator’s profit function, its first derivative:

\[
\frac{\partial \pi_1}{\partial \lambda} = \frac{(a - b(C_1 + C_2))}{4b} \cdot \frac{(a - b(C_1 + C_2))}{8b} = \frac{R}{(2 - \lambda)^2}
\]

Also because of \([a-b(C_1+C_2)]/4b=R\), so operators can obtain the critical preference points \(\lambda_1^* = 0.586\), the operator’s preference interval \(\lambda_1 \in [0.586, 1]\).

Similarly, the profit functions of network agents, its derivative \(\frac{\partial \pi_2}{\partial \lambda} = -\lambda R/(2-\lambda)^3\), the critical point of preference, the preference of agents’ interval \(\lambda_2 \in [0, 0.635]\).

From the above, we can see that the network operators and agents have their own preferences range and hope the market share of their preference within the range, and the bigger the better. As can be seen from Figure 1, network operators and agents to cooperate with each other in the market is \([\lambda_1^*, \lambda_2^*]\), that is \([0.586, 1])\%[0, 0.635]=0.586, 0.635]. Taking into account the proportion of more than 5% for a level of the actual situation, take\(\lambda=0.6, 1-\lambda=0.4\), that is, network operators and agents market accounted for the best cooperation ratio of about 6 to 4.

6. CONCLUSION

Competition in the network industry has already broken through the boundaries of individual enterprises and expanded to the entire value chain, in the market more directly to the performance of the competition between operators and agents. The network marketing channel is gradually formed in the long-term competition, a comprehensive system to operators as the core, composed of a series of complex structure of economic organization. In the diversification, hybrid hierarchical structure, the conflict between members of the objective existence can hardly be avoided. The appropriate range of conflict benign, can promote the competition and cooperation between members of the channel, but the malignant, large area of conflict, it will affect the efficiency of the channel, and will lead to collapse of the channel system.
This article first summarizes domestic and foreign scholars’ research on theory of channel conflict and channel power, channel member satisfaction, the relationship between power strategies and satisfaction. Combined with the background of telecommunications industry, appropriate research model and research hypotheses are proposed.

We are able to conclude that the use of channel power is a double-edged sword, on one side, it would help operators to enhance their profit in a short term, however, on the other side, and it will reduce the credibility of both sides, causing “Prisoner's Dilemma” and a lose-lose result. If the agents in the market can freely change their favored carriers, operators that use less channel power will eventually win in the market, despite there is some short-term losses on revenue growth. Apart from that, illegal behaviors like hidden transactions of agents will ultimately impact the market, resulting in the “public land” tragedy and further deteriorating the market environment. To be able to form a good reputation among operators and agents, operators should take caution to consider using channel power.

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