Customer Selection in CRM implementation:
Firms' strategies in the competitive market with network externality

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Abstract

Customer profitability recognition is easier with CRM enabling technologies and the strategy of firing unprofitable customers prevails in the market. However, in the digital and Internet age, network externality is becoming more important. Therefore, the concern over firing unprofitable customers has increased. Our research is intended to develop strategic guidance for customer selection when firms implement CRM in the market with network externality.

Keywords

CRM, customer selection, network externality

1. Introduction

The Information Technology (IT) revolution has enabled firms to collect and store an enormous volume of customer data, analyze customer profitability, interact more effectively with customers, and customize services or products for customers. Moreover, it has created a new marketing paradigm, Customer Relationship Management (CRM). The objective of CRM is to maximize profit by retaining customers and leverage customer value. However, some authors have noted that not all customers are equally profitable (Peppers & Rogers 1997, Reichheld 1996). IT as a CRM-enabler allows for detailed analysis of each customer and therefore, increases the focus on customer profitability when CRM strategy is implemented. Peppers and Rogers (1997) insist that firms must treat different customers differently depending on customer profitability. Many research papers also agree with the strategy of firms' cream skimming of profitable customers (Ryals & Knox 2001, Winer 2001, Nairn 2002). "Demarketing" (Kotler & Levy 1971) or "Creative filtering program" (Reichheld) or "Firing" (Peppers & Rogers 1997) is suggested as treatment of the unprofitable customers who contribute less than the cost of serving them.

However, the above studies only focus on the effect of the customers' direct value on profit and don't consider the second-hand effects of the customers (Söderlund & Vilgon 1999). However, in the digital and Internet age, customers' indirect value, which affects other users, is becoming more important. The Internet, email, computer hardware, computer software, music players and music titles are typical network industries (Oz Shy 2001). In these industries, customer utility is positively affected by the number of customers using the same products or services (Oz Shy 2001). Therefore, in the software industry, a firm can be better off approving piracy to create indirect value from the users who use pirated versions of the software even though they don't contribute to the direct revenue of the firm via software purchasing (Conner & Rumelt 1991, Slive & Berhardt 1998). It means that even the customers who don't contribute direct profit to the firm still can be valuable as long as the indirect value of the customers exceeds the direct profit loss of serving them. In this paper, we investigate the impact of network externality on customer selection in the market where network externality exists.

In section 2, we present the basic setting of the model. In section 3, we investigate the case of when one firm implements CRM. In section 4, we investigate the case of when two firms implement CRM. In section 5, we compare the result of the cases. In section 6, we conclude the research.

2. Basic Model Setting

We assume that there exist two competitive firms in the market. Their products or services are not differentiated and their cost structure is also similar. Therefore, they have evenly split the market and the number of customers. Additionally, they are competitive enough to make zero profit totally.

There are $4N$ customers in the market. We assume $4N$ customers for calculation simplicity. Both firms have retained $2N$ customers. As mentioned in the previous section, customers are not equally profitable. Customers pay different amounts of the money depending on their acknowledged value of the product or the service itself. We assume customer profitability, τ is uniformly distributed from 0 to 2. And the cost of serving them is 1 regardless the customer profit contribution.

If firms deploy CRM, firms can leverage customer value and finally make customers more

profitable. Then, the customer profitability becomes $\tau'(\delta,\tau)$. δ represents the effectiveness of CRM for leveraging customer value. Without loss of generality, we simply assume $\tau'(\delta,\tau)=\delta\tau$. We assume the cost of serving upgraded service with CRM is $c'(\delta)$, and we simply assume that $c'(\delta)=\delta$. Additionally, we assume that with CRM, the firm can get information on customer profitability of their own customers with whom it had relationships, and also the potential customers who had relationships with the other firm. However, we assume the firm cannot get enough information about potential customers to leverage value.

Customer utility function is defined as

$$U_j(\tau_i,q_j)=PU_j(\tau_i)+NU_j(q_j)$$

Customer utility is divided into two parts, utility from using the product or service itself and utility from the size of the network. We assume that utility from using the product or the service is proportional to τ_i of customer i. Therefore the customer who has higher τ_i tends to have bigger utility. On the other hand, we assume that the utility from the size of the network is proportional to the number of customers using it. For simplicity we assume $PU_j(\tau_i)=\tau_i$ and $NU_j(q_j)=q_j$. j represents firm1 or firm2. We assume that customers consume the good in each period and there exists no switching cost from firm1 to firm2. However, we assume that the customers have bounded rationality so that they can only access the information of the previous period and they can only expect the level of utility based on that. Given expected utility, they choose the firm. If both firms offer the same level of expected utility, they prefer to stay in the firm in which they have traded.

$$EU_j(\tau_{i,t-1},q_{j,t-1})=PU_j(\tau_{i,t-1})+NU_j(q_{j,t-1})$$

If the customers were treated with upgraded service with CRM from the firm, the expected utility function becomes

$$EU_j(\tau_{i,t-1},q_{j,t-1})=PU_j(\tau'_{i,t-1})+NU_j(q_{j,t-1})$$

We assume two cases depending on the situation.

Case 1 - Only firm1 implements CRM. In the first period firm1 selects customers. On the other hand, firm2 retains all the previous customers since it doesn't deploy CRM. In the second period, customers select a firm based on changed expected utility.

Case 2 – Both firms implement CRM. In the first period both firms simultaneously choose the customers to serve. In the second period, customers select a firm based on changed expected utility.

3. Case 1

In the first period, firm1 selects customers to serve. The selected customers are divided into VIP and General. The profit contribution by VIP is $\tau'(\delta,\tau)$ and the cost of serving them is $c'(\delta)$. The profit contribution by General is τ and the cost of serving them is 1. The threshold of VIP is x_{12}^{C1} and the threshold of General is x_{11}^{C1}. Therefore, the profit function of first period, π_{11}^{C1} is

$$\pi_{11}^{C1}=\int_{x_{12}^{C1}}^{1}(\tau'-c')Nd\tau+\int_{x_{11}^{C1}}^{x_{12}^{C1}}(\tau-1)Nd\tau$$

In the second period, the expected utility function of all General customers of firm1 to keep using firm1 in the second period is less than the expected utility function of General a of firm1 to move to firm2 since the network size of firm2 is greater.

The expected utility function of VIP b of firm1 to keep using firm1 in the second period is

$$EU_1(\tau_{b,1},q_{11})=PU_1(\tau'_{b,1})+NU_1(q_{1,1})$$

The expected utility function of VIP b of firm1 to move to firm2 in the second period is

$$EU_2(\tau_{b,1},q_{2,1})=PU_2(\tau_{b,1})+NU_2(q_{2,1})$$

In this case, $NU_1(q_{1,1})<NU_2(q_{2,1})$, however $PU_1(\tau'_{b,1})>PU_2(\tau_{b,1})$. Therefore, the customer remains in firm1 if $EU_1(\tau_{b,1},q_{11})\geq EU_2(\tau_{b,1},q_{2,1})$. In this case, increased value with CRM dominates the decreased network value. This situation holds if $\tau_b\geq\frac{x_{11}^{C1}}{\delta-1}$

On the other hand, the customer moves to firm2 if $EU_1(\tau_{b,1},q_{11})<EU_2(\tau_{b,1},q_{2,1})$. In this case, increased value with CRM cannot dominate the decreased network value. This situation holds if $\tau_b<\frac{x_{11}^{C1}}{\delta-1}$

Therefore, the profit function of the second period of firm1, π_{12}^{C1} is

$$\pi_{12}^{C1} = \int_{\frac{x_{11}^{C1}}{\delta-1}}^{x_{11}^{C1}} (\tau' - c')Nd\tau$$

Totally, firm1 makes profit for 2 periods as follows:

$$\pi_1^{C1} = \int_{x_{12}^{C1}}^{1} (\tau' - c')Nd\tau + \int_{x_{11}^{C1}}^{1} (\tau - 1)Nd\tau + \int_{\frac{x_{11}^{C1}}{\delta-1}}^{x_{11}^{C1}} (\tau' - c')Nd\tau$$

It is derived optimal $x_{12}^{C1*} = 1$ and optimal $x_{11}^{C1*} = \frac{1}{\delta^2 - \delta + 1}\left(2\delta^2 - 3\delta + 1\right)$ if $\delta < 2$ and $x_{11}^{C1*} = 1$ if $\delta \geq 2$.

4. Case 2

Firm1 and firm2 play a non-cooperative game. We derive the reaction function of firm2 to maximize profit as follows. Firm2 can extract firm1's VIP in the second period through making x_{21}^{C2} lower than x_{11}^{C2}. Then in the second period, VIP of firm1 whose τ is lower than $\frac{\left(x_{11}^{C2} - x_{21}^{C2}\right)}{\delta - 1}$ will move to firm2. Firm2 serves its own customers in both periods and serves the customers of firm1 who move to firm2 in the second period. Then the profit function of firm2 is

$$\pi_2^{C2} = 2\left(\int_{x_{22}^{C2}}^{1} (\tau' - c')Nd\tau + \int_{x_{21}^{C2}}^{1} (\tau - 1)Nd\tau \right) + \int_{x_{21}^{C2}}^{\frac{x_{11}^{C2} - x_{21}^{C2}}{\delta-1}} (\tau - 1)Nd\tau$$

The profit function is convex, so the optimal profit is a boundary solution. We call the lower boundary solution $LB_{x_{21}^{C2}}\left(\pi_2^{C2}\right)$ and the upper boundary solution $UB_{x_{21}^{C2}}\left(\pi_2^{C2}\right)$. The boundary of x_{21}^{C2} is defined satisfying $1 \leq \frac{x_{11}^{C2} - x_{21}^{C2}}{\delta - 1} \leq 2$.

On the other hand, firm2 can make $x_{21}^{C2} = x_{11}^{C2}$ In this case, firm2 only serves its own customers in both periods. The profit function is derived as

$$\pi_2^{C2}{}_{|x_{21}^{C2} = x_{11}^{C2}} = 2\left(\int_{x_{22}^{C2}}^{1} (\tau' - c')Nd\tau + \int_{x_{21}^{C2}}^{1} (\tau - 1)Nd\tau \right)$$

The profit $\pi_2^{C2}{}_{|x_{21}^{C2} = x_{11}^{C2}}$ always dominates $UB_{x_{21}^{C2}}\left(\pi_2^{C2}\right)$. Therefore, the optimal profit of firm2 becomes $\pi_2^{C2}{}_{|x_{21}^{C2} = x_{11}^{C2}}$ or $LB_{x_{21}^{C2}}\left(\pi_2^{C2}\right)$ depending on x_{11}^{C2*} as follows:

$$\pi_2^{C2}{}_{|x_{21}^{C2} = x_{11}^{C2}} \text{ if } x_{11}^{C2*} \leq \hat{x}$$

$$LB_{x_{21}^{C2}}\left(\pi_2^{C2}\right) \text{ if } x_{11}^{C2*} > \hat{x}$$

$\hat{x}$ represents $6\delta - 5 - \sqrt{24\delta^2 - 48\delta + 25}$. Therefore the reaction function of firm2 is derived. Likewise, the reaction function of firm1 is also symmetrically derived. The optimal equilibrium solution is derived as $x_{11}^{C2} = x_{21}^{C2} = \hat{x}$.

5. Results

Proposition 1. Network externality makes firms to keep unprofitable customers if CRM effectiveness is not large enough.

Proof. $x_{11}^{C1*} = 1$ if $\delta \geq 2$. If $\delta \geq 1 + \frac{1}{6}\sqrt{3}$, $\hat{x} \geq 1$.

If competitor doesn't exist in the market, the profit of the firm is maximized by only retaining profitable customers. However, the existence of the competitor makes a firm to retain unprofitable customers to enlarge its network size. Only large enough CRM effectiveness can eliminate the network value effect.

Proposition 2. If network externality exists in the market, the firm has to retain more customers if the other firm doesn't implement CRM than in the case of the other firm implementing CRM.

Proof. See figure 1.

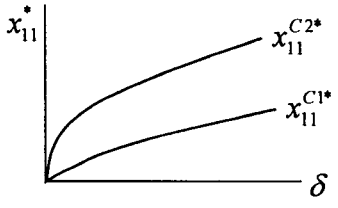

Figure 1. Comparison of thresholds

If firm2 doesn't implement CRM, firm2 retains all the previous customers and maintains the maximum network size. However, if firm2 implements CRM, it cuts off some of the highly unprofitable customers. Therefore, firm1 must retain more customers so as not to loose profitable customers to firm2 if firm2 doesn't implement CRM because of the network value.

Proposition 3. If network externality exists in the market, as the effectiveness of CRM gets greater, the firm that implements CRM could decrease the number of unprofitable General customers.

Proof. $\frac{\partial x_{11}^{C1*}}{\partial \delta} > 0$ and $\frac{\partial \hat{x}}{\partial \delta} > 0$ hold.

We can see that more effective CRM implementation can reduce the effect of network value. However, the firm still has to consider the effect of network externality even after CRM implementation.

6. Concluding Remarks

As CRM is introduced, firms expect to cut off all the losses caused by unprofitable customers and focus more on profitable customers. The strategy that cuts off unprofitable customers is known as the general strategy that implements CRM, and it is practiced in various industries. However, our research shows that the firm in the market with network externality must consider the network externality effect even after CRM is introduced. The firm must consider the effect more in case the other firm in the market doesn't implement CRM. CRM effectiveness can reduce the effect of network externality, and only when the CRM effectiveness dominates the total effect of network externality, the firm can deselect and fire unprofitable customers freely.

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