



## EQUILIBRIUM OF E-CHANNEL RELATIONSHIP AND DECISIONS

Huei-Chen Hsu<sup>1+</sup> --- Hui-Chu Chen<sup>2</sup> --- Li-Fen Tsai<sup>3</sup> --- Sheng-Wen Liu<sup>4</sup>

<sup>1,2,3,4</sup> Department of Marketing Management, Trans World University Yunlin, Taiwan

### ABSTRACT

*The Web2.0 model has aroused vast attention as it alters the traditional role of consumers' purchase behavior. This paper examines the problems of E-Channel coordination; the focus of this paper is that completely measures the utility function and the "maximally" separating equilibrium diverse choice alternatives. The impact of complexity on consumer choice combines to affect the consistency of consumers' choices is not well understood. The low quality products distribute through retailers with no reputation Channel of distribution consists of different channel members' decision. Therefore, the authors found that even if low quality manufacturers have no reputation of their products, they can signal quality by posting the reputation of high reputation of retailers.*

**Keywords:** E-Channel relationship, Channel distribution, Retailers' reputation, Purchase behavior, Quantity discount, Profit sharing.

Received: 5 January 2015 / Revised: 26 January 2015 / Accepted: 2 March 2015 / Published: 5 March 2015

### Contribution/ Originality

The paper's primary contribution is finding an equilibrium foundation for a manufacturer's choice of retailer and provides an example of renting another agents reputation to signal product quality when one does not have any reputation of one's own. Another aspect, this paper demonstrates the fundamental nature of the channel coordination problem and the identification of quantity discount schedules and more generally variable price contracts as coordinating mechanism.

## 1. INTRODUCTION

Among the new models that are developing, Web2.0 is by far one of the most prominent trends (Hsu and Lin, 2008). A channel of distribution consists of different channel members each having his decision variables. Meanwhile, given consumer willingness to pay more for a high quality good and given the low unit cost of producing a low quality well, a moral hazard problem arises in that a manufacturer has an incentive to produce a low quality product and try to pass it off as high quality good to signal its quality to the consumers.

For example, a manufacturer cannot signal quality by Nike branding if it does not have an established brand name. Nor can a manufacturer advertise heavily to signal quality if it does not have sufficient capital to do so because of an imperfect capital market. In fact, several empirical

<sup>+</sup> Corresponding author

studies have shown that when the perceptions of store names are more favorable, the buyers' perceptions of product quality are higher (Ramirez and Hachiya, 2012) (Harris et al., 2000) (Cooke et al., 2002).

The objective of this article is to examine the problem of channel relationships and decisions variables. First, this paper shows that in a "maximally" separating equilibrium where the maximum number of manufacturers' product quality is revealed, a manufacturer of a high quality product will signal product quality by selling through a retailer with a strong reputation. Second, with a general demand function, this study attempts to analyze one channel aspect, namely coordination.

In the next section, the author starts to analysis by formalizing the relationships and decision variables of each channel member in the two-member channel. To avoid analogies which seek to view channel members as agent and principal, or follower and leader. With comparisons put the manufacturer and the retailer in the role of coordinator and coordinated, thus avoiding the real problems of coordination such as the motivation for these roles, how these roles evolve and the stability of these roles. After formalizing the model, then the paper begins to analyze the problems of E-channel decisions. To make key decision variables endogenous the paper shows insight of the incentives relationships coordination and the individual decision disincentives for E-Channel.

### 1.1. The Model

#### 1.1.1. Basic Definitions

Figure 1 shows the manufacturers as boxes and the retailers as circles. The manufacturers are subscripted by  $i=1, \dots, n1+n2$  and the retailer who is matched with manufacturer  $i$  is subscripted by  $M(i)$ . The consumer who buys manufacturer  $i$  product is also subscripted by  $i$ . Note that not all high quality manufacturers can be matched with reputable retailers because there aren't enough reputable retailers.

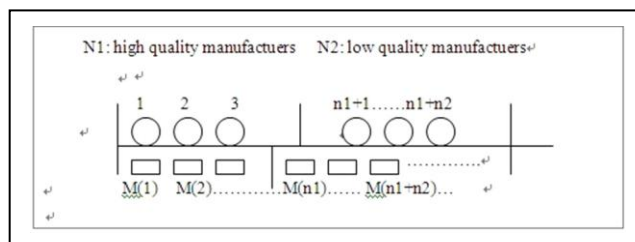


Fig-1. Matching of Manufacturers with Retailers

The consumer  $i$  decision is whether to buy manufacturer  $i$  product or buy nothing. The net utility of consumer,  $V_i$ , is of a von Neuman-Morgenstern type represented as  $V_i=U_i-P_i$  where,  $U_i$  is the utility derived from product  $i$  and  $P_i$  is the retail price.

#### 1.1.2. A Formulation of Profit

Some variables are:

$\Pi, \pi$ : profit functions of manufacturer and retailer.

$F, f$ : total fixed costs.

$C, c$ : variable costs of manufacturer and retailer per unit.

$D(p)$ : consumer demand as a function of retail price.  $P, (dD/dp) < 0$  ;

$G, g$ : margins of manufacturer and retailer per unit.

With the proceeding notations and assumptions, manufacturer profits are given by  $\Pi=GD-F$  and retailer profits by  $\pi=gD-f$ , where the channel margin  $G+g$  is linked to retail price  $p$  by the relation  $p=G+g+C+c$ .

#### 1.1.3. The Extension Formulations

The proceeding formulation does not recognize that both the manufacturer and the retailer usually have other control variables besides  $G$  and  $g$ . Therefore, the author adds a second control

variable  $Q$  for the manufacturer. Consequently, the profit function of the manufacturer becomes  $\Pi = GD - F - Q$ . The same situation also exists for the retailer who, in addition to deciding which margin to take, can also decide how much point-of-sale effort to put into the product, for example, shelf-space. Hence, another control variable  $s$  is introduced so that the retailer's profit function becomes  $\pi = gD - f - s$ .

The extended formulation is general in that the demand for the product is  $D(p_1, p_2, \dots, p_n)$  where  $p_1$  through  $p_n$  are the prices of competitive products carried by other retailers. This means that  $p_i = R_i(p)$  where  $R_i(p)$  is the reaction taken by product  $i$ . Therefore, the reaction functions will behave so that:

$$\frac{\partial D}{\partial P} = \frac{\partial D}{\partial P} + \sum_{i=1}^n \frac{\partial D}{\partial P_i} \frac{dR_i}{dP} < 0$$

#### 1.1.4. The Game Extensive Formulation

The sequence of moves in the extensive period game is as follows.

1. Potential entrants in the retail market decide sequentially whether to enter by investing or not.
2. Each manufacturer offers a wholesale price to reputable retailers.
3. There exists a matching market where the manufacturers who offer the highest margins.
4. Those manufacturers who were not matched with a reputable retailer or who did not offer any wholesale price in step 2 are matched with discounters. These manufacturers offer a wholesale price to discounters.
5. The retailers decide whether to carry the product and what retail price to charge.
6. Stage 2 through 6 repeated infinite with a new set of manufacturers in each period.

The profit of manufacturer  $i$  of quality  $q$  (=high, low) is:

$$\max \Pi_i = W_i^q - C_q$$

$$W_i^q - C_q$$

The single period profit of the retailer  $j$  of  $T$  (=Reputable, Discounter) that is matched with product  $i$  is:

$$\max \pi_j = P_j - W_i^T$$

#### Maximally Separating Equilibrium

Given the above restrictions on consumer behavior the author then shows the proposition that there exists a unique "maximally" separating equilibrium.

*Proposition 1: Assume that there are  $n_3 (< n_1)$  reputable retailers, consumers punish dishonest retailers by boycotting them forever, and consumers buy in each period if and only if the surplus from buying the product is positive.*

*Proposition 2: In a maximally separately equilibrium with endogenous sequential entry, as the number of reputable retailer increases, their profits will increase as long as  $n_3 < n_1$ .*

*Proposition 3: In a maximally separately endogenous sequential entry equilibrium,  $n_3 = n_1 - 1$  and reputable retailer earns positive profits while discounters earn zero profits.*

## 1.2. The problems For E-Channel Decisions

### 1.2.1. Joint Ownership

If both channel members agree to cooperate, there will be more total profit to divide between them. One method for cooperation is to have a centralized decision-maker dictate all channel decision. The alternative is possible with joint ownership often called vertical integration. However, in many real situations, there are many problems with vertical integration (Lal and Sarvary, 1999).

### 1.2.2. Simple Contracts

Some alternative to vertical integration is a legal contract specifying each channel member's decision variables. With vertical integration, this control is relegated to a centralized authority. Unfortunately, although both channel members might agree to such a contract, each could find actions which would make them, in the short run, unilaterally more profitable at the other's expense. This problem could be mitigated by strict enforcement of the agreement but even with

enforcement both parties would continue to have an incentive to circumvent the spirit of the contract.

The manufacturer might want to prevent this problem by contractually requiring the retailer to buy a fixed number of units at a fixed price. This solution may be more desirable than contractually specifying each retailer promotional variable because it leaves the retailer the freedom to optimize shelf-space, product store location, point-of-purchase displays and other promotional methods over which the retailer has particular expertise.

### 1.2.3. Implicit Understandings

However, one might ask whether foresighted partners might obtain the benefits of coordination without having to sign an explicit contract. It is beyond the scope of this paper to go into the important issues surrounding implicit understandings as just defined. Of course, at this point in the analysis, it has been assumed a world of certainty where the variables defined are known. Hence, cheating and the associated contract enforcement problems may disappear. Even in the real world of uncertainty, enforcement costs may still be reasonable and contracts may be a suitable mechanism for coordination (Holbrook, 1999).

### 1.2.4. Profit Sharing

The result of channel coordination can be achieved by a profit sharing mechanism. Suppose the manufacturer receives fraction  $k_1$  of channel profits plus a fixed amount  $k_2$  while the retailer receives fraction  $1-k_1$  ( $0 < k_1 < 1$ ) minus the fixed amount  $k_2$  so that manufacturer profits and retailer profits are given by:

$$\Pi = k_1 [(G+g)D] - F + k_2$$

$$\pi = (1-k_1) [(G+g)D] - f - k_2$$

We can see that because the profit variables are all linearly related, the conditions for maximizations are compatible, i.e. all are related to:

$$(G+g) \frac{dD}{dP} + D = 0 \quad \text{required for a joint maximum.}$$

### 1.2.5. Quantity Discounts

Quantity discounts represent a subtle mechanism for achieving profit sharing (Weigel and Baumann, 1993) (Tsai *et al.*, 2006). When a manufacturer does not offer quantity discounts, the manufacturer obtains a constant profit of  $G$  for each additional unit sold by the retailer. But in order to sell additional units of product, the retailer must decrease the retailer price, i.e. his margin. Therefore, the retailer can be given a quantity discount by the manufacturer. The retailer then has the incentive to share additional unit. In fact, the manufacturer has the incentive to share additional profits until the decrease in price is no longer worth the resulting increased volume. At this point, the combined channel profits are maximized.

## 2. CONCLUSION

The paper provides an example of renting another agents reputation to signal product quality when one does not have any reputation of one's own. The authors give an equilibrium foundation for a manufacturer's choice of retailer. That is, not having any brand reputation. At a fundamental level of analysis, there may be more than one reason for the coexistence of reputable retailers and discounters. Heterogeneous consumer preferences for retail service quality may be one reason why there exist retailers of both types. This phenomenon of signaling quality by selling through a retailer has common elements with other economic as well as noneconomic behavior such as celebrity endorsements, political endorsement and letters of recommendation, and a model similar to the one presented here could be used as a starting point.

Another aspect, this paper demonstrates the fundamental nature of the channel coordination problem. By deriving the classical result, a lack of coordination will lead to margins which are too high by global channel standards. The analysis indicates that such limited experimentation can lead to misleading conclusions because experimentation of this type does not consider channel coordination. For example, consider typical competition between two retailers. Such competition,

suppose that neither retailer can significantly change his market share because the other retailer will match his price decreases. Eventually, each retailer might maintain a price above the price suggested by a retail experiment which does not consider the other retailer's reactions.

Although the study provides useful insights, its limitations suggest interesting opportunities for future research. First, the economic analysis in this paper indicates in the long-term consequence there would be a less profitable retailer despite experimental prediction. Moreover, if the channel was not coordinated, the experiment would indicate levels for price and non-price variables that are optimal only in appearance since actions initiating coordination might lead to even better profits.

The major implication of this paper is the identification of quantity discount schedules and more generally variable price contracts as coordinating mechanism. Research presented here has important managerial implications. First, quantity discounts provide an improvement over simple contracts which include fixed conditions. This added flexibility can allow the individual channel members to respond to temporary conditions without breaking the contract. Second, quantity discounts provide a mechanism useful for vertical integration. As the study already noted, a centralized decision-maker may not possess all the skills and information required to perform all the channel functions. The centralized decision-maker can provide price schedules rather than fixed prices to each channel manager. Therefore, the individual manager would retain some freedom to set his decision while still having the incentive to seek coordination.

Funding: This study received no specific financial support.

Competing Interests: The authors declare that they have no competing interests.

Contributors/Acknowledgement: All authors contributed equally to the conception and design of the study.

## REFERENCES

- Cooke, A.D., J. Sujjan, H. Sujjan and B.A. Weitz, 2002. Marketing the unfamiliar: The role of context and item-specific information in electronic agent recommendations. *Journal of Marketing Research*, 39(4): 488-497.
- Harris, K., B. Steve and C. Parker, 2000. Understanding the consumer experience: It's good to talk. *Journal of Marketing Management*, 16(3): 111-127.
- Holbrook, M.B., 1999. *Consumer value: A framework for analysis and research*. New York: Routledge.
- Hsu, C.L. and J.C.C. Lin, 2008. Acceptance of blog usage: The roles of technology acceptance, social influence and knowledge sharing motivation. *Information Management*, 45(1): 65-74.
- Lal, R. and M. Sarvary, 1999. When and how is the internet likely to decrease price competition. *Marketing Science*, 18(4): 485-503.
- Ramirez, P.G. and T. Hachiya, 2012. Intangible assets and market value of Japanese industries and firms, product evaluations. *International Journal of Technology Management*, 59(1/2): 1-21.
- Tsai, H., H. Juang, Y. Jaw and W. Chen, 2006. Why online customers remain with a particular e-retailer: An integrative model and empirical evidence. *Psychology and Marketing*, 23(5): 447-464.
- Weigel, A. and S. Baumann, 1993. A modified levenstein-distance for handwriting recognition. *Proceedings of the 7th International Conference on Image Analysis and Processing*, Bari.

*Views and opinions expressed in this article are the views and opinions of the author(s), International Journal of Management and Sustainability shall not be responsible or answerable for any loss, damage or liability etc. caused in relation to/arising out of the use of the content.*