

Association for Information Systems

## AIS Electronic Library (AISeL)

---

ICEB 2004 Proceedings

International Conference on Electronic Business  
(ICEB)

---

Winter 12-5-2004

### From Control to Competition: Trust Institution in E-Business

Yunfu Huo

Baixin Yang

Jianjun Wang

Qiong Guo

Follow this and additional works at: <https://aisel.aisnet.org/iceb2004>

---

This material is brought to you by the International Conference on Electronic Business (ICEB) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICEB 2004 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact [elibrary@aisnet.org](mailto:elibrary@aisnet.org).

# From Control to Competition: Trust Institution in E-Business

Yunfu Huo, Deli Yang, Jianjun Wang, Qiong Guo

School of Management, Dalian University of Technology, Dalian, Liaoning 116024, China  
somdyang@dltu.edu.cn

## ABSTRACT

Global economy has formed a huge challenge to the trust of traditional business. It's a important problem of all enterprise how to build a effective trust institution in the new economy. The rapid development of E-business is bringing a turning point of trust institution. In traditional trust institution, trust means that principal controls the agent in fact. The evolution of trust institution was closely related to the development of technology because of control. This paper presents, with the innovation of technology and system, precondition of trust through the method of controlling has already been out of the existence. The development of E-business will have influence on the evolution of trust institution, Advantages of E-business can promote monitor from man-made to market-made, from control to competition. It will build an effectual trust institution.

**Keywords:** trust, control, competition, E-Business, advertising game

## 1. INTRODUCTION

Global economy has formed a huge challenge to the trust of traditional business. It's an important problem of all enterprise how to build an effective trust institution in the new economy. The rapid development of E-business is bringing a turning point of trust institution.

## 2. THE PROBLEM AND CHALLENGE

### 2.1 The traditional trust

Trust is a definite expectation of other's action (Gambetta, 1988) as well as an active ability that engage oneself to accept the many social institution (Zucker, 1986). Trust is necessary to reduce transaction cost, and help business organizations operate better (Miles & Snow, 1992). Trust becomes a pivotal factor of the thought and philosophy of management (Miles & Greed, 1995). Trust is rooting in three patterns: process based trust, character based trust, and institution based trust (Zucker, 1986). Institution, especial comparability and reciprocal experience decide the trust (Arrow, 1984). Trust was a situation that we relied on others; it meant dependence together with risk. Because calculativeness is ubiquitous (Williamson, 1998), the trust of coming from dependence means that principal controls the agent in fact. Trust is derived from distrust. The premise of trust is the exchange of direct interaction and sensing knowledge. So some scholars think that management is one art of control (Putti & Wehrich & Koontz, 1998).

### 2.2 Trust and technology

The evolution of trust institution is closely related to the development of technology because of control (Kipnis, 1991). The development of technology is divided into three stages: skills based technology, which corresponding to the era of producing by hand; the routine technology, which corresponding to the era of

producing by machines; informational technology, which corresponding to the era of producing by intelligence (Faunce, 1981). The principal cannot only simply rely on the agent's moral because of the complicated technology. The dependence is more displayed that whether the agent can better deal with the technology, at this moment, the need of agent's skills and moral improved highly. It was more difficult to control than before. Further more the way that technology used make the implied terms of traditional trust out of existing, more and more trades based on multi-region and provisional colony were substituted trades of self-region and steady colony (Kipnis, 1994), codified knowledge which is gradually replacing the sensual knowledge is becoming basis of the trade (Masahiko Aoki, 2001).

## 3. TRUST IN E-BUSINESS: AN ADVERTISING GAME MODEL

Because the traditional trust institution has relied on strong ethical hypothesis, it can be described as a game model. Players have all or part knowledge of the game structure. The trust institution is a common strategy choice of players, and it can be self-enforcing. We will analyze the trust institution by an advertising game model that is reformed by Spence's job market model (Spence, 1974).

### 3.1 Advertising game model

Because of asymmetric information, bargainors know the quality level of their goods, buyers don't. But the information of quality can be transferred to buyers by advertising. According to Spence-Mirrlees condition (Spence & Mirrlees, 1974), there are different costs of advertising between different quality. The cost of advertising is inverse ratio of quality. The efficiency improvement of different quality is different.

Thinking of a buyer and a bargainer. Quality has two estates: if  $\theta = 1$ , the quality is low, if  $\theta = 2$ , the quality is high. The bargainer is clear of the real value of  $\theta$ , but the knowledge of the buyer is only the probabilities of quality. Let the probability is  $p$ :  $p(\theta = 1) = p(\theta = 2) = 1/2$ . Before contracting, the bargainer will select advertising level. Let the level is  $s$ :  $s \in \{0,1\}$ ,  $s = 0$  means advertising,  $s = 1$  means no advertising. The cost of advertising is  $C(s, \theta) = s/\theta$ . After advertising is observed, the buyer will decide the price  $w(s)$ . The bargainer will choose whether receiving the price or not. If being received, the buyer has an expected value:  $y = \theta$  (it is a hypothesis that advertising isn't influence of value), the bargainer's expected utility is  $U(s, \theta) = w - s/\theta$ . The buyer's expected utility is  $\pi(s, \theta) = \theta - w(s)$ . Otherwise,  $U = \pi = 0$ . At one time, it is a hypothesis that there is a complete market, so when the market has an equilibrium, price will be equal to expected value and the buyer's expected utility is 0.

### 3.2 The game of trust in control

The analysis of this game model has two angle of view: symmetric and asymmetric information games. By symmetric information, advertising needs many costs but has no value. So whether high with low of the quality, bargainer will choose  $s = 0$ , the price of low quality is  $w(\theta = 1) = 1$ , the price of high quality is  $w(\theta = 2) = 2$ . There is trust institution in the market this time. But this Pareto dominance equilibrium will not exist in asymmetric information games. If the buyer doesn't know  $\theta$ , his expected value will be  $y = 0.5 \times 1 + 0.5 \times 2 = 1.5$ , the competition of players will have a result in  $w = 1.5$ . But, when the advertising can transfer quality signal to buyers,  $w = 1.5$  would not able to be Nash equilibrium (Zhang, 1996).

Traditional trust institution is built by a hypothesis of symmetric information games. Besides of a strong common share of the institution, it also needs a small self-region market. Along with the development of technology, the bound of market is more and more expanding. The hypothesis of traditional trust institution is removing from the fact. For obtaining the symmetric information, many other forcing controls are necessary, such as quality standard, understanding of craftworks and abilities, etc. In fact, the trust has been equal to the control. The essence of "dependence and control" has brought high cost, and can't meet the demand of trust in the times of global economy. The principal cannot far directly control the behavior of the agents because of his bounded rationality. Controlling has sharpened the contradiction between the principal and agent.

### 3.3 The game of trust in competition

Though the traditional business environment has stronger regional characteristics, the conditions of the hypothesis of the trust are easier to realize, the controlling, as a kind of ways to form trust, can work in a certain extent. With the innovation of technology (modern manufacturing, modern transportation and modern information) and system (the freedom of trade), the modern economy becomes globally day by day, precondition of trust through the method of controlling has already been out of the existence. Under this environment, the agent who is prone to calculativeness will not promise openly, so the effective trade can only be realized on terms that the trust is restrained from reliably supporting (Williamson, 1998). As the important displaying form of the technology at the third stage, E-business is not only the handed technology, but also is the main means to change the environment. The development of E-business will have influence on the evolution of trust institution.

In E-Business, by the regional difference of culture and moral, the belief of traditional trust institution will not be more and more common shared. Because of the asymmetric information of quality, buyers can only observe  $s$  not  $\theta$ , so the price will only be decided by  $s$ . Let  $\mu(\theta = 1|s)$  is the buyer's posterior probability of low quality when he has observed  $s$  that the bargainer selected. Perfect Bayesian equilibrium means: (1) the bargainer selected  $s(\theta)$ , (2) the buyer knows  $\mu(\theta = 1|s)$  and decides  $w(s)$  by the "s" that he has observed. The result is: ① by  $w(s)$ ,  $s(\theta)$  is the best choice of the bargainer when quality is  $\theta$ ; ② by  $s(\theta)$ ,  $\mu(\theta = 1|s)$  is accordant to Bayesian ruler,  $w(s)$  is the best choice of the buyer.

The equilibrium may be pooling or separating. First, pooling equilibrium (PE) means the bargainer selected same advertising in different qualities and won same price. By  $s(\theta) = 0$ ,

$$(PE) : \begin{cases} s(\theta = 1) = s(\theta = 2) = 0 \\ w(0) = w(1) = 1.5 \\ \mu(\theta = 1|s = 0) = 0.5 \\ \mu(\theta = 1|s = 1) = 0.5 \end{cases} \quad (1)$$

It means no advertising of any qualities is Pareto dominance equilibrium. The buyer considers there is no quality signal in advertising, so the price is equal to the expected utility. Because of the buyer's Pareto dominance equilibrium is  $w = 1.5$ ,  $C(1, \theta) > 0$ , so  $s(\theta) = 1$  is impossible, the bargainer's Pareto dominance equilibrium is no advertising ( $s(\theta) = 0$ ) (Zhang, 1996).

Because we assume the buyer will not rework his prior probability when he finds  $s(\theta) = 1$ , (PE) is Pareto

dominance equilibrium. The invariable prior probability in advertising game demands players have share-beliefs of sensual knowledge and codified knowledge, by all appearances, it could not come to existence in global economy and E-business. If the buyer's posterior probability is  $\mu(\theta = 1|s = 1) = 0$ , it means the quality advertised must be high, the (PE) will not come into existence. For by  $\mu(\theta = 1|s = 1) = 0$ , when the bargainer's choice is  $s(\theta) = 1$ , the buyer's choice will be  $w(1) = 2$ . The high quality will select advertising,  $U(s = 1, \theta = 2) = 2 - 1/2 = 1.5$ . No advertising is poor,  $U(s = 0, \theta = 2) = 1 - 0 = 1$ , so we will have the separating equilibrium (SE):

$$(SE) : \begin{cases} s(\theta = 1) = 0, s(\theta = 2) = 1 \\ w(0) = 1, w(1) = 2 \\ \mu(\theta = 1|s = 0) = 1 \\ \mu(\theta = 1|s = 1) = 0 \end{cases} \quad (2)$$

(SE) is perfect Bayesian equilibrium. When the buyer has selected the posterior probability and the price, if  $U(s = 1, \theta = 2) = 1.5 > U(s = 0, \theta = 2) = 1$ , the quality is high, the best strategy is advertising; if  $U(s = 0, \theta = 1) = 1 \geq U(s = 1, \theta = 1) = 1$ , the best strategy is no advertising when the quality is low. Otherwise, by the bargainer's choice, the buyer's posterior probability is based on Bayesian ruler, so the price strategy is Pareto dominance, and other (SE) isn't being (Zhang, 1996).

#### 4. CONCLUSIONS

The advertising level is a signal in (SE) which transfers information of quality to buyers. Spence-Mirrlees condition is the precondition of this game equilibrium. When the same advertising is selected, the cost of high quality is lesser than low quality, the high quality will have enough incentive to separate itself from others by advertising. Otherwise, for winning same price, the low quality will have enough incentive to simulate the high quality by same advertising strategy. Thus the buyer will not believe the advertising as a quality signal. It will bring on market failure if there is not enough quality information in other ways. The trust isn't being. So we will see the conclusions as follows:

1. In global economy and E-business, because of scarcity of sensual knowledge, the condition of strong ethical hypothesis in traditional trust institution is not being. The new trust's game model should be more and more based on "an invisible hand" (Smith, 1776). The ethical hypothesis is feeble.

2. In E-Business, Spence-Mirrlees condition makes it clear that the system assuring of real advertising is necessary. If the discount factor  $\delta > 0$ , players will have enough incentive to tell the truth in infinitely repeated games (Rasmusen, 1994). It is necessary to

build and improve the stable common E-Business market by strong legal system. The third party will regulate players' actions in market, such as quality, reality of advertising, etc. The certification authorities and the continuous open newsreel of business can make the cost is too expensive to lie.

3. If the bargainer's quality information can help buyers purchase properly, advertising can improve the effect of resource allocation. By taking the advantages of E-business that can help to share the mass codified knowledge, purchase and supply on-line can bring an effect of vendue. The good-right order can translate from traditional mode such as prior plan, unite control, posterior mediation, into the mode of contract that based on real product (Masahiko Aoki, 2001). Lesser asymmetry and uncertainty information will make enough incentive of the bargainer to improve quality. At one time, opening competition can promote monitor from man-made to market-made by the endogenous punishment mechanism by constantly repeated games. It is from control to competition.

#### ACKNOWLEDGEMENT

This paper is supported by the National Natural Science Foundation of China (No: 70031020).

#### REFERENCES

- [1] Arrow, K., *The limits of organization*, New York: Norton, 1984.
- [2] Faunce, W.A., *Problems of an industrial society*, New York: McGraw-Hill, 1981.
- [3] Gambetta, D., Can we trust trust? In D. Gambetta (Eds.), *Trust: Making and breaking cooperative relations*. Oxford, UK: Basil Blackwell, 1988.
- [4] Kipnis, D., "The technological perspective", *Psychological Science*, No. 2, 1991.
- [5] Kipnis, D., "Accounting for the use of behavior technologies in social psychology", *American Psychologist*, 49, 1994.
- [6] Masahiko Aoki., *Towards a Comparative Institutional Analysis*, Shanghai: Shanghai Far East Publishers, 2001
- [7] Miles, R.E., & Snow, C.C., "Causes of failure in network organizations", *California Management Review*, Vol. 34, No. 4, 1992.
- [8] Miles, R.E., & Greed, W.E.D., "Organizational forms and managerial philosophies: A descriptive and analytical review", *Research in organizational behavior*, Vol. 17, 1995.
- [9] Putti, J.M. & Wehrich, H. & Koontz, H., *Essentials of Management: An Asian Perspective*, Singapore: McGraw-Hill. Book Co-Singapore., 1998.
- [10] Rasmusen, Eric, *Games and Information: An Introduction to Game Theory*, Cambridge: Blackwell Publishers, 1994.
- [11] Smith, A., *The Wealth of Nations*, Shijiazhuang: Hebei Science & Technology Publishers, 2001.

- 
- [12] Spence, A. M, "Job Market Signaling", *Quarterly Journal of Economics*, Vol .87, 1974.
- [13] Williamson,O.E, "Calculativeness, trust, and economic organization", *Journal of Law and Economics*, Vol .34, 1998.
- [14] Zang, Weiyang, *Games and Information Economics*, Shanghai : Shanghai people's Publishers, 1996.
- [15] Zucker,L.G, "Production of trust: Institutional sources of economic structure, 1840~1920", *Research in organizational behavior* , Vol .8, 1986.