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AN ANALYSIS OF QUALITY CONTROL GAME BETWEEN ONLINE SHOPPING PLATFORMS AND SELLERS UNDER COMPLETE INFORMATION

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ABSTRACT

From the perspective of online shopping platform's quality control and informed by the game theory, this paper attempts to build a static model of the game of complete information between the online shopping platforms and sellers in China, aiming to improve the level of product quality in the online shopping market. Through anatomizing the game model, it purports to reveal the internal operation mechanism of the quality supervision game between the online shopping platforms and sellers.

Keywords: online shopping platform, seller, control, game theory, Nash equilibrium.

INTRODUCTION

According to the monitoring data of China E-Commerce Research Centre (www.100EC.cn), complaints about e-commerce retailers in 2016 accounted for 64.20% of all e-commerce complaints, of which online shopping accounted for 52.54%, representing the highest proportion. In the face of the frequent phenomena of problems with the quality of the products traded via online shopping, how to implement effective quality control has become the most urgent issue for both consumers and the government. Due to lack of effective control, many unscrupulous e-businesses have not been punished for their malpractices, resulting in the odd phenomenon of "bad money drives out good money," which actually has got increasingly grave in recent years, and consequently fake and shoddy goods run wide in the online shopping market.

The main reason why online shopping product quality control problems have not been effectively solved lies in which online shopping exists the separation characteristics among the information, in-kind, goods, selling sites and other subjects, and such separations between these entities have led to serious information asymmetry in regard to online quality control, which has exasperated the difficulty of implementing quality control over them (Li, Wen and Shi, 2015).

Online shopping platforms, as the third-party for providing online transactions, have their responsibility and obligation in their supervision. This is not only the requirement by their business model and the relevant policies, laws, and regulations, but also the inevitable choice when the current social credit system in China is still inadequate (Li, Sun and Wen, 2013). By applying the theory of game, this paper aims to analyse the online shopping product quality control that China may set up, which comprises two levels of the online shopping platforms and sellers. This effort may be conducive to clarifying the internal operation mechanism for China's online shopping product quality control in order to improve the effectiveness of its online shopping product quality control.

RESULTS AND CONCLUSIONS

This paper builds the payment matrix of mixed strategy game model between the online shopping platforms and sellers as follows (see Table 1). And from the above payment matrix, we know that the expected profits of both the online shopping platforms and sellers are π_p, π_s, then we can get the value of α^*, β^*.

Table 1 - Payment matrix of mixed strategy game between the online shopping platforms and sellers

Seller		Online shopping platforms	
		Control	No Control
		α	$1 - \alpha$
Integrity	β	$P_{s1} - C_s$, $P_{p1} - C_p$	$P_{s1} - C_s$, P_{p2}
No Integrity	$1 - \beta$	$P_{s2} - L_s - F_s - C_s$, $P_{p1} - C_p + F_s$	$P_{s2} - L_s$, $- L_p - F_p$

$$\pi_p = \alpha\beta(P_{p1} - C_p) + \alpha(1 - \beta)(P_{p1} - C_p + F_s) + \beta(1 - \alpha)P_{p2}$$
$$+ (1 - \alpha)(1 - \beta)(-L_p - F_p) \tag{1}$$

$$\pi_s = \alpha\beta(P_{s1} - C_s) + \alpha(1 - \beta)(P_{s2} - L_s - F_s - C_s)$$
$$+ \beta(1 - \alpha)(P_{s1} - C_s) + (1 - \alpha)(1 - \beta)(P_{s2} - L_s) \tag{2}$$

$$\alpha^* = \frac{C_s + P_{p2} - P_{p1} - L_s}{C_s + F_s} \qquad \beta^* = \frac{P_{p1} + F_s + F_p + L_p - C_s}{P_{p2} + F_s + F_p + L_p} \tag{3}$$

In summary, we can get the positive and the negative relationship between α^* (the probability of the online shopping platforms controlling the sellers), β^* (the probability of the sellers choose integrity management) and other variables, shown below in Table 2. This study purports to reveal the internal operation mechanism of the quality supervision game between the online shopping platforms and sellers.

Table 2 - Positive and negative relationships between parameter variables

The main variable	Positive	Negative
α^*	P_{p1}; F_p; L_p; F_s	C_p; P_{p2}
β^*	P_{s2}; F_s	P_{s1}; C_s; F_s; L_s

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