



# Trust fraud: A crucial challenge for China's e-commerce market



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## ABSTRACT

Currently, China's e-commerce market is growing at an unprecedented pace, however, it is faced with many challenges, among which the trust fraud problem is the biggest issue. In this article, we use Taobao as an example and conduct a thorough investigation of the trust fraud phenomenon in China's e-commerce market. We present the development history of trust fraud, summarize its unique characteristics, and explore the reasons why so many sellers commit fraud. We further propose a dynamic time decay trust model that aims to deter trust fraud by raising its cost and promote the growth of small and medium-sized sellers. The model utilizes detailed seller ratings as the data source, and incorporates a transaction amount weight, a time decay coefficient, and three trust factors in the calculation of trust. We test the model on real transaction data from Taobao, and the experimental results verify its effectiveness. Our proposed trust model yields a practical approach to online trust management not only in the Taobao market but also for other e-commerce platforms.

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## 1. Introduction

In recent years, China's e-commerce market is developing very rapidly. The total e-commerce sales increased to RMB5.88 trillion (US\$944 billion) in 2011, a year-on-year increase of 129.2%, which accounts for 4.32% of total retail sales in China (The Beijing News 2012). According to an analysis by the Boston Consulting Group, by the end of the year 2015, the size of China's e-commerce market will possibly surpass that of the U.S. market and become the world's next e-commerce superpower (Walters et al. 2011).

On the surface, China's e-commerce market appears to be flourishing, however, it faces many challenges, among which the trust fraud problem is the biggest issue. In this article, we utilize Taobao as an example to carry out an in-depth look at this problem, which has been ignored before. Taobao now is in a prime position, dominating China's consumer-to-consumer (C2C) market with a 90.3% market share, followed by Tencent's Paipai with a 9% market share.

To manage trust among buyers and sellers, Taobao has adopted a similar feedback system to eBay. On Taobao, each buyer can offer a feedback rating to the seller after completing a transaction. A positive rating raises a seller's trust score by one point. A negative rating lowers a seller's trust score by one point. A neutral rating does not affect a seller's trust score. The overall trust score is accumulated by adding these ratings together.

Taobao makes use of "heart", "diamond", "crown", and "gold crown" to denote different seller trust levels. (In contrast, eBay

uses stars to denote seller feedback scores. As a seller's feedback score increases, his star will change color.) On Taobao, each level includes a scale of 1 to 5. For example, a trust score of at least 4 earns a seller one heart, and a trust score of at least 251 earns a seller one diamond. If a seller's trust score reaches 10,001, her trust level will be upgraded to one crown. If her trust score continues to grow and reaches 500,001, then she will receive one gold crown. Thus, the higher the trust score, the more trustworthy will the seller be. This feedback system enables buyers to examine sellers' previous transactions and provides valuable reference for buyers to make purchase decisions. Reputable sellers are rewarded and may enjoy premium prices and a higher probability of future sales (Brown and Morgan 2006).

Although there are sellers on eBay who manipulate trust by purchasing or exchanging positive feedback ratings (BlackHat-World 2010, 2012), the feedback system has still proven to be quite effective (Brown and Morgan 2006). Taobao has met a big challenge using a similar feedback system though. Compared to eBay, Taobao's trust fraud problem is much more serious. Here's why:

### 1.1. Trust fraud is widespread on Taobao

According to Taobao's research, the highest percentage of detected fraud transactions accounted for about 47% of all the rated transactions and the lowest percentage was nearly 9% during the period from October 17, 2008 to May 17, 2009 (Chen and Yang 2009). It is not only the small sellers who artificially boost their reputations. Also there are super sellers who commit trust fraud to make their businesses look prosperous so as to attract more customers. A seller will feel left behind if all of her competitors

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artificially increase their reputations when the seller does not. A gold-crown seller, with a score of 500,001 points on Taobao, confessed to a reporter that half of his trust scores before getting the gold crown title were all obtained by committing trust fraud (MoneyWeek 2011). Estimates suggest that about 80% of Taobao sellers have committed trust fraud during the process of their businesses, more or less (MoneyWeek 2011).

### 1.2. Trust fraud breeds a huge gray industry

Since many sellers hope to promote their reputations as quickly as possible, some professional scammers see this as an opportunity. They have begun to offer services to artificially increase seller's trust scores. The part-time jobs of scammers now have turned into a large gray industry, in which sellers are the core, and buyers, scammers, trust fraud companies and logistics companies are all involved on the periphery. The interests of all sides are closely related and quite complicated. According to the available statistics, there are about 1,000 active trust fraud companies that are operating inside the Taobao ecosystem at present. Among them, there are three to five that manage to earn millions of RMB each year (Beijing Youth Daily 2009). Suppose that there are four million active sellers on Taobao and a quarter of them pay RMB500 (US\$80) annually to artificially boost their reputations. This creates RMB1 billion (US\$160 million) in the trust fraud market.

### 1.3. Trust fraud corrupts China's e-commerce

Since it takes little time and effort to increase reputation by committing fraud, many fraudulent sellers rely on this shortcut and gradually deviate from the principles of conducting honest business. They are anxious to achieve quick success and get instant benefits. A fraudulent seller's reputation can increase extremely fast. In recent years, many sellers have committed trust fraud on Taobao to boost their reputations, which leads to reputation inflation: all sellers have high trust scores eventually. Buyers are already aware of this feedback-based trust-enhancing strategy. They have doubts about the effectiveness of Taobao's feedback system as a result. Some of them do not trust the system any longer, which in turn reduced buyer-seller trade in this marketplace. Some participants may stop shopping online and will not come back again.

In this article, we mainly focus on the trust fraud problem in China's e-commerce market and propose a new dynamic trust model. This article is laid out as follows. Section 2 provides a literature review. Section 3 discusses the trust fraud phenomenon, and analyzes its characteristics and the reasons behind its development. Section 4 presents our proposed dynamic trust model, which aims to decrease the chances of online trust fraud and promote the growth of small-sized and medium-sized sellers. Section 5 presents our experimental results and proves the effectiveness of our proposed trust model. Section 6 concludes.

## 2. Literature Review

There has been a lot of research on the e-commerce trust across various disciplines, including Economics, Management, Computer Science and Sociology. Brown and Morgan (2006) and Dini and Spagnolo (2009) have shown that fraudulent sellers artificially enhance their reputations by trading positive feedback ratings on eBay. These sellers listed items such as e-books, jokes or riddles for a very low price, like a penny, inclusive of shipping fees. The words "positive feedback" may be included in the title of an auction or hidden in the text of its description, which suggests that this is a sale or an exchange for feedback ratings. More than 6500 listings on eBay involving feedback trade were identified over

the period from June to December 2005 (Brown and Morgan, 2006). Even at the end of year 2008, it was still easy and cheap to manipulate trust on eBay (Dini and Spagnolo 2009).

Nowadays, eBay does not allow sellers to include the word "feedback" or to make any reference to eBay feedback in a listing title except when that word is used to describe the item for sale (eBay 2012). As a result, the public feedback market has disappeared, however, trust fraud still exists. Fraudulent sellers make posts in forums or websites outside of eBay to look for partners who are willing to exchange positive feedback ratings. They discuss fraud strategy in posts or through private email messages (BlackHatWorld 2010, 2012). If fraudulent sellers commit fraud in a careful and secret way, the results of their actions are very hard to detect.

Ba (2001) has pointed out that online trust can be established through a community responsibility system. In addition, Ba and Pavlou (2002) have investigated the extent to which trust can be induced by proper feedback mechanisms, and how some risk factors play a role in the process of trust formation. Later, Ba et al. (2003) proposed a trusted third party who assigns a digital certificate to each participant in online auction communities. The analytical results demonstrate that a market participant should behave honestly to maximize her benefits.

Zacharia and Maes (2000) proposed a centralized trust model SPORAS, which introduces a reputation mechanism for loosely connected online communities. Kamvar et al. (2003) presented EigenTrust, a distributed and secure model to compute global trust values based on power iteration. The algorithm aggregates the normalized local trust values by a weighted sum of all raw reputation ratings. In Ramchurn et al. (2003), a concrete computational trust model was developed, which took into account both the direct and indirect interactions between agents.

Wang and Vassileva (2003) proposed a Bayesian network-based trust model to combine different aspects of trust. Yu and Singh (2000) presented a social mechanism for reputation management which aims at avoiding interaction with undesirable participants. Liang and Shi (2005a, 2005b) developed a trusted middleware for P2P applications by combining two models. PET, a personalized trust model, employs reputation and risk evaluation, and M-CUBE, a multiple-currency based economic model, laid a foundation for resource-sharing in untrustworthy peer-to-peer (P2P) computing environments.

Xiong and Liu (2003, 2004) proposed PeerTrust, an adaptive trust model for quantifying and comparing the trustworthiness of peers. The model is based on a weighted sum of five factors including feedback records, feedback scope, credibility, transaction context and community context. Bizer and Oldakowski (2004) outlined a trust architecture that has trust policies combining reputation, context and content-based trust mechanisms.

Other related work has touched on trust in recommender systems. Donovan and Smyth (2005) have indicated that the trustworthiness of users plays an important role in guiding recommendations and they presented two computational trust models. The experimental results showed that their models managed to improve the predictive accuracy during recommendation. Andersen et al. (2008) used an axiomatic approach from the theory of social choice and proposed a recommender system in which agents cannot induce others to share their opinions by lying or modifying their trust links. Massa and Avesani (2004) have advocated a trust-aware collaborative filtering algorithm to increase the coverage of recommender systems while providing more accurate rating predictions.

Compared with previous works, our contribution is threefold. First, we thoroughly investigate trust fraud in China's e-commerce industry, and reveal the seriousness of this problem. Second, we give a detailed introduction on the historical evolution of trust

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