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

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A B S T R A C T

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...
artificially increase their reputations when the seller does not. A
gold-crown seller, with a score of 500,001 points on Taobao, con-
fessed to a reporter that half of his trust scores before getting the
gold crown title were all obtained by committing trust fraud (Mon-
eyWeek 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 opportu-
nity. They have begun to offer services to artificially increase sell-
ner’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 re-
lated and quite complicated. According to the available statistics,
there are about 1,000 active trust fraud companies that are operat-
ing inside the Taobao ecosystem at present. Among them, there are
three to five that manage to earn millions of RMB each year (Beij-
ing 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 infla-
tion: all sellers have high trust scores eventually. Buyers are al-
ready aware of this feedback-based trust-enhancing strategy.
They have doubts about the effectiveness of Taobao’s feedback sys-
tem 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 liter-
ature review. Section 3 discusses the trust fraud phenomenon, and
analyzes its characteristics and the reasons behind its develop-
ment. 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 pre-
sents 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 en-
hance 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 auc-
tion 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 disap-
ppeared, 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 discus-

s 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 fac-
tors play a role in the process of trust formation. Later, Ba et al.
(2003) proposed a trusted third party who assigns a digital certif-
icate to each participant in online auction communities. The ana-
lytical 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 con-
ected online communities. Kamvar et al. (2003) presented Eigen-
trust, a distributed and secure model to compute global trust
values based on power iteration. The algorithm aggregates the nor-
malized 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 includ-
ing feedback records, feedback scope, credibility, transaction con-
outlined a trust architecture that has trust policies combining rep-
utation, context and content-based trust mechanisms.

Other related work has touched on trust in recommender
systems. Donovan and Smyth (2005) have indicated that the trust-
worthiness of users plays an important role in guiding recommen-
dations 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 can-
not 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 cover-
age 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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