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## Turning the Corner: Mislabelling of Online Shops

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**Abstract:** The booming development of E-Commerce saw the trading volumes grow each year. One of the risks for retailers engaging in electronic commerce is the dreaded pricing error. However, there have been instances of mislabelling on websites. As soon as hackers spot any deviation of online price tags from market levels, they would place rush orders and quickly accumulate trading volumes. This study observes 48 mislabelling incidents online in 2000~2010. The research motivation is surrounding the unusual 22 mislabelling incidents in 2009~2010. The biggest contribution of this study is the finding that the PageRank values of websites surge after a massive number of consumers accessing the websites with mislabelled price tags. In an interesting twist, online shopping sites benefit from putting wrong prices on products, especially for the websites that appear mostly on the second or later page on results derived from a search performed on a search engine. The wrong price tags move them to the top 10 items on the first page of searched results. Whilst mislabelling may damage reputations of these websites in the short run, proper risk management, crisis handling and incentives acceptable to consumers can turn this into blessing in disguise. A positive response from media and recognition from consumers can enhance brand profiles and impress the public as a responsible company. If all managed well, mislabelling can be a good thing.

**Key words:** E-Commerce, search engines, mislabeled prices, consumer hackers, PageRank

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### INTRODUCTION

The traditional commerce used to be defined by the physical presence of both the buyer and the seller. After the advent of the electronic age, boundaries of time and geography have been erased (Obe and Balogun, 2007). E-Commerce is the purchase, sale or exchange of products/services on the Internet. Consumers are often restricted by business hours and distance when it comes to bricks-and-mortars. However, they can shop anytime and anywhere on B2C websites. The privacy of online shopping is another attraction. As a result, the number of non-planned purchases and the quantity of purchased goods are both much higher (Koufians, 2002). Besides product and service, delivery innovation of E-Commerce can reduce substantial environmental problems through network communication and reduce product supply chain (Hossain, 2002). Nowadays E-Commerce as one of the most important ways of trading between sellers and buyers is field of attention (Darooei and Khayyambashi, 2010).

Online activities have been facilitating the living styles and working habits of many people and firms more and more every passing year and as the competition

between the organization increases, organizations become more and more willing to catch up with the new technology in order not to be left behind the competition (Sipahi and Dogerlioglu, 2008). Internet Data Center (2009) indicates that the population of online shoppers worldwide exceeded 624 million people in 2009. The transaction value of B2B and B2C was close to \$8 trillion and is expected to exceed \$16 trillion in 2013. The huge business opportunities mean fierce competition and hence, considerable budgets for marketing and advertising are required. In 2009, the global online advertising spending amounted to \$61 billion and is expected to reach \$100 billion in 2013. Most of the consumers browse around and compare websites to look for bargains (Laffey, 2010).

The study finds that 62% of search-engine users can find the information they want on the first page of the searched results. As many as 90% of the users can find the products, services and information required on the first three pages of the searched results (Fig. 1) (Iprospect, 2006). If an online shopping site is immediately clicked by consumers, the probability of generating transactions is dramatically increased. As soon as consumer hackers spot any deviation of labeled prices

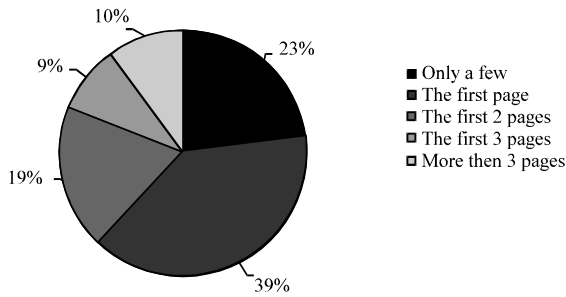


Fig. 1: No. of pages browsed by percentages of users (Iprospect, 2006)

online from market prices (Fig. 2), they will seize the opportunities and quickly place orders. Meanwhile, they will brag about their trophies online (Martin, 2006). Other consumers will follow suit.

If online shopping sites do not execute the orders, they may face pressures from consumer protection groups and collective demands from consumers for damages. This is detrimental to company images (Computerworld, 2009). However, they are subject to heavy losses if they fulfil the orders (Elite Choice, 2010). Understandably, consumers who have placed orders are concerned with how the online shopping sites handle such matters (Blogspot, 2009). As a result, they often browse these sites. A large number of site visits during these periods helps to boost PageRank of the online shops in question.

Will a public announcement of mislabelling events attract curious consumers to search, access and browse these websites? It is expected that some consumers want to uncover the products with misplaced price tags and this may improve PageRank of the websites as a result of increased links and visitors. These initiate our research interest.

All the pricing on shopping websites is handled manually. However, it is difficult to eliminate errors with detailed inspections due to a large number of brands and products. It is usually too late when online shops notice the mistakes because many orders have been placed already. Mislabelling causes losses in the bottom line and damages reputation. Therefore, online shopping sites always keep a low profile in handling such events and few scholars have paid attention to this issue. Some scholars use Jess, a programming language for experts systems and ontology syntax to infer a relevant structure, and perform empirical tests on a major consumer electronic online shop in Taiwan. It is proved possible to automatically detect mislabelling on websites and dramatically reduce the manpower and time required to check product prices (Liou *et al.*, 2009).



Fig. 2: BESTBUY mislabelled the price of a Samsung 52" LCD TV from \$1799.99 to \$9.99 on August 12, 2009 (<http://www.techbang.com.tw/?p=14773>)

This study observes the mislabelling of all types of shopping websites and finds that there are a total of 48 mislabelling incidents worldwide in 2000~2010. Among them, 26 incidents occurred in 2000~2008 and 22 occurred in 2009~2010. The number of incidents in 2009~2010 accounts for 45.8% of the total 48. A further examination finds that a large number of consumer hackers access these websites and push up the PageRank of such websites. As a result, they may appear among the top 10 entries on the first page of searched results. Although mislabelling may have adverse effects on the reputation, it may bring in intangible benefits with proper risk management, crisis handling and acceptable compensations to consumers. Positive responses on media and acknowledge from consumers may boost brand publicity and create an image of a responsible company.

## RESEARCH BACKGROUND

In the past, search engines could yield a large number of documents but only a small number of such documents are relevant. Relevant entries may not necessarily appear at the top of search results (Gudivada *et al.*, 1997). The effectiveness of searching have greatly improved along with the enhancement of search engine functions. However, the ability of users to read between webpages does not change. Given time constrains and limited patience, information searchers are often bothered with the first few result pages. Therefore, accurate tools are required to ensure relevant pages to be listed among the top 10 entries of searched results (Brin and Page, 1998). In order to improve information retrieval precision, Bedi and Chawla (2007) proposed a method to improve the retrieval precision of search engine by using information scent and multimodal feature of clicked pages in query log mining. The algorithm is based on clustering query sessions

using information scent of clicked URLs in the sessions which model the information need associated with the query sessions.

Studies on the behaviour of search engine users suggest that 62% of users can find the information or webpages they require on the first page of searched results. As many as 90% of users can find the products, services or information needed among the first three pages of search results. Research also indicates that the top-ranking websites in searched results strike users as the websites with the strongest brands. This is why brand marketers believe that top-ranking in searched results can enhance brand images and publicity of Internet companies (Iprospect, 2006). In other words, the higher the ranking, the stronger the brand publicity and industry reputation.

If an online shopping website cannot appear among the first three pages of searched results, the website is less likely to attract users or establish good reputations among users.

#### **CALCULATION OF PAGERANKS**

Take Google for example, the search engine calculates title tags, keywords density and anchor texts and ranks the searched results based on whether the webpages provide the contents required and how popular such contents are. The key determinant to rankings is PageRanks of specific websites. A high PageRank means it is more likely for a webpage to be listed on the top. It increases click rates and brings in potential business opportunities.

PageRank is the rankings of websites, measured with the number of links to and from other websites. Its value ranges from 0 to 10 (Brin and Page, 1998). Hyperlinks are a vote of trust to the linked websites. Thousands of webpages may match the search keywords but the results are ranked in accordance with PageRank. A high PageRank indicates the importance of the webpage in question. The website with the highest PageRank will be listed as the first entry on the first page of searched results. The website with the second highest PageRank will be shown as the second entry on the first page of the results and so forth (Gralla, 2006; Langville and Meyer, 2006).

The calculation of PageRanks is usually based on the following three factors. Firstly, if Webpage B is linked to Webpage A, it means Webpage B considers Webpage A important. The more a webpage is hyperlinked by other webpages, the more important the webpage and the higher its PageRank is. Secondly, hyperlinks from the webpages with high PageRanks (i.e. important webpages)

indicates recognition of the relevance of the webpages linked to. Even if the number of these important webpages is small, they carry a heavy weight and such links may dramatically boost PageRanks of the webpages in question. Thirdly, if Webpage B provides hyperlinks to more than one webpages, the PageRank of Webpage B will be diluted on a pro-rata basis.

Based on the three factors, this paper proposes the following hypothesis: if a website is hyperlinked from a large number of other webpages for some reason and some of the referral webpages are important (with high PageRanks), the PageRank of the website concerned will rise.

This study examines the 48 incidents of mislabelling by online shops. The results suggest that mislabelling of price tags may attract a large number of consumers. Even if the wrong information has been removed, consumers who are either curious or have placed orders will be concerning whether the orders are cancelled or delivered. They will continue to log on, for a short period of time. As a result, the PageRank of the website in question surges and the probability of appearing among the first 10 entries of the first page of search results rises dramatically.

#### **PAGERANK CHANGES AFTER MISLABELLING OF PRICE TAGS ONLINE**

This study examines 48 incidents of mislabelling of price tags online in 2000~2010. A large number of visitors to the websites having provided wrong pricing information will boost the PageRanks of such sites. Even after the wrong information has been removed, consumers are concerned about how the online shops handle the problem. Will they cancel orders on the excuses of out-of-stock or wrong price tags? Will they apologize to the buyers, cancel the orders but provide some compensation, e.g. cash, vouchers or gifts? Or, will they deliver the orders by absorbing the losses in order to maintain their reputations? Consumers continue to log on because they want to know what will happen next.

Among the above mentioned 48 incidents, 12 instances happen to the repeating websites at different times. In other words, these websites do not really learn the lesson. Hence, the number of observed online shopping sites is 36. This study tracks the daily PageRank values of these websites for two months whenever such events are reported in media. PageRanks will go up first, immediately after the posting of wrong price tags and then go down after things quiet down (approximately 22th~45th days). Some websites prefer dealing with the trouble of cancelling all the orders than taking the losses, due to an enormous amount of orders have been placed,

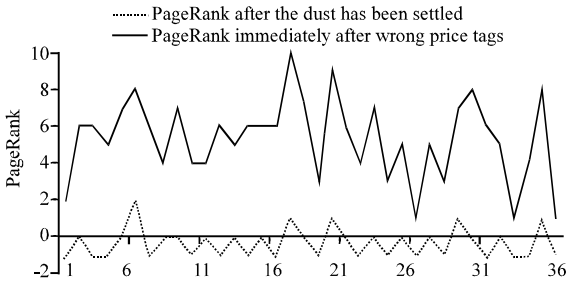


Fig. 3: PageRanks (solid lines) of the 36 online shopping sites apparently higher than the values after things are settled (dotted lines)

or even take legal measures against consumers. However, the longer the deadlock, the more sustainable the surged PageRanks are. In contrast, if online shopping sites are willing to bear the losses and calm things down, the rise in PageRanks do not last for long.

This study plots the observed PageRank values with Excel, with X axis indicating the websites having mislabelled price tags and Y axis representing the PageRanks of these websites (Fig. 3).

### PATTERNS OF PAGERANK CHANGES POST MISLABELLING

This study observes three patterns of PageRank changes (Fig. 4-6) post price tag mislabelling. The X axis represents time and the Y axis indicates PageRanks.

**Type 1 (Fig. 4):** In August 2009, Crowne Plaza Hotel Venice East-Quarto D'Altino, a four-star hotel in Italy, indicated on its website that its room charge per night was €0.01. More than 5,000 order rushed and all the rooms available in 2009-2010 were fully booked. The hotel claimed that the orders were valid (Etravel news, 2009). The PageRank of the website surged to 4, but went back to 1 after the event.

**Type 2 (Fig. 5):** In April, 2006, unimall mislabelled the price of a NT\$8, 200 handset to NT\$82. A consumer hacker seized the opportunity and placed orders for nearly 200 handsets. The total orders exceeded 1,000 handsets. However, the website decided not to deliver and gave vouchers worth NT\$200 instead. The PageRank of this website hovers between 0 and 1 at normal times, but it shot up to 5 after the event (Fig. 5) and then dropped to 0 after the dust was settled. The high PageRank only lasted 10 days as the website claimed the tag was wrong and declined to deliver orders.

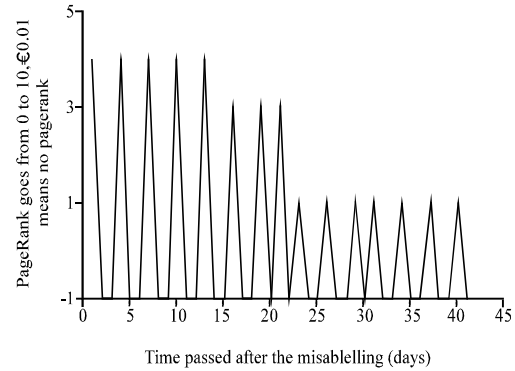


Fig. 4: Changes to the PageRank of Crowne Plaza Hotel Venice East-Quarto D'Altino post price tag mislabelling

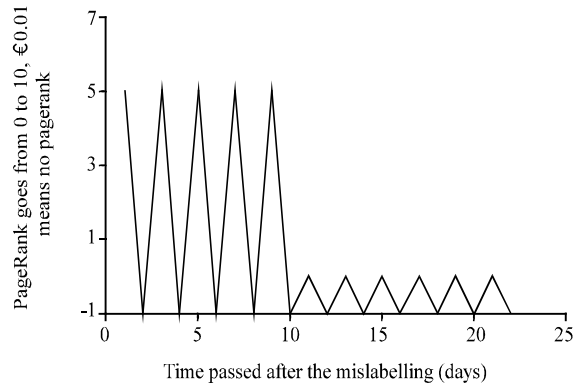


Fig. 5: The PageRank of unimall website went up for a short while after the mislabelling of a price tag, but resumed the normal level ex-post

**Type 3 (Fig. 6):** This type of PageRank changes usually happens to large shopping websites. Given the large number of orders placed, the websites have to spend considerable manpower on the processing of orders, estimates of possible losses, identification of causes for errors, punishment of responsible employees and formulation of responding strategies. It is also possible to have to deal with concerted protests from consumers by only writing or apologizing to them. Consumer protection organizations may demand for order deliveries. Some discontented consumers may even take it to the courts. If the first offer is not acceptable to consumers, the websites may have to offer other incentives, hoping to calm things down and protect corporate images. The changes to PageRanks in fact reflect the attitude of consumers accessing the websites after the mislabelling of price tags.

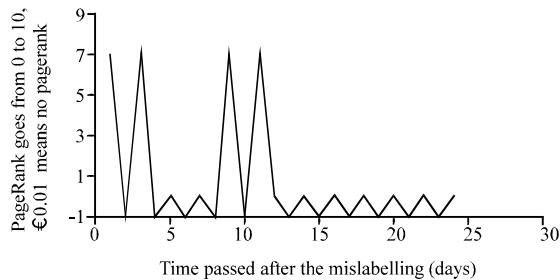


Fig. 6: The PageRank of HP’s website went up for a while after the mislabeling of product prices. However, it declined after the event was settled

**CONCLUSION**

This study proposes the following hypothesis. If a shopping website is referred to by a large number of other webpages in a short period of time and such referral websites have high PageRank values, the PageRank of the shopping website in question will also rise. An empirical study and statistical surveys show that mislabelling is one of the key factors to the improvement of PageRank.

A large number of visits in a short period of time to the shopping websites that have mislabelled products can in fact boost PageRank. When consumers search with keywords, the probability of such websites appearing among the top 10 entries on the first page of searched results goes up. This creates a perception that the brand names of such websites must be on the top of their leagues. As a result, it boosts publicity and increases the number of clicks. Good crisis management and risk control can build customers’ satisfaction and create the image as a responsible company. If well handled, mislabelling can turn out to be a blessing in disguise.

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