Social Influence of Product Popularity on Consumer Decisions: Usability Study of Flickr Camera Finder

Li Chen
Department of Computer Science
Hong Kong Baptist University, Hong Kong
lichen@comp.hkbu.edu.hk

ABSTRACT

"Product popularity" is in-depth explored in this paper, regarding its practical role within a consumer's decision process. Specifically, the usability evaluation of a novel product finder service (Flickr Camera Finder) shows that users more frequently consulted it, rather than a standard shopping site, to locate popular products. User comments further revealed their credibility concerns and tendency to trust the "popularity" from social resources. Design implications from the experiment are summarized at the end, indicating suggestive directions to integrate social media data to boost current e-commerce decision tools.

Author Keywords

Social influence, product popularity, usability study, Flickr camera finder, consumer decision behavior, e-commerce.

ACM Classification

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Experimentation, Human Factors, Measurement.

INTRODUCTION

The homepage of an e-commerce website for a specific product category (e.g., digital cameras), covers most of its space to give initial product recommendations, commonly under labels of "most wanted", "popular products", "top ones under $500". These products essentially act as starting points for consumers to get familiar with the product domain, especially when their target is not clear at the start. Indeed, the "product popularity" information has been regarded as one type of important social factors that will impact users' purchase decisions [2]. Sociologists term the effect as "social influence" and point out that it will play a crucial role to assist users in reducing the uncertainty and amount of information that they must process to make a decision [2,5].

However, the question is: do users in reality perceive the popular items credible as displayed in current e-commerce

sites? Given that the credibility is strongly correlated with the user's acceptance intention [4], it is definitely of meaning to explore the issue for the development of convincible social recommendations.

Specifically, in this paper, we study the usability of a novel product finder service, "Flickr Camera Finder", that mainly provides product popularity info based on the analysis of Flickr metadata (i.e., members who have uploaded at least one photo or video with a particular camera over a certain time). By comparing it with standard e-commerce tools, we attempted to answer the following specific concerns: 1) how do users perceive the "popular products" suggested in Flickr Camera Finder, and would it be different from the user perception in a normal e-commerce site? 2) How do popularity-based recommendations practically act within a consumer's whole decision making process? 3) How can user-generated content as from Flickr, be best exploited to generate more effective decision systems to deliver user benefits (such as the improvement on their decision confidence when searching for high-risk products)?

EXPERIMENT METHOD

In order to find answers to above questions, we have performed an empirical study including both of objective user behavior observations and qualitative interviews. The study was launched in July 2009 and 12 participants (3 females) volunteered to join. For each of them, it took around two hours: one hour to test assigned websites and another hour to freely provide any of her/his comments and suggestions. They are mainly Master or PhD students in our department with ages between 20 and 40. All of them have online shopping experiences.

Experimental Procedure

The experiment was designed in a free-choice scenario. That is, two websites were provided as options: Yahoo Shopping (as the representative of standard e-commerce websites, shopping.yahoo.com) and Flickr Camera Finder (www.flickr.com/cameras/). The participant can use either one or both to accomplish the task of "*finding a digital camera you are prepared to buy*". The task was performed after an initial stage of familiarizing themselves with the two websites, so that the choice was completely dependent on their true willingness. Our goal was thus to observe how frequently the subject used Yahoo Shopping (henceforth Yahoo CF) and/or Flickr Camera Finder (henceforth Flickr CF), and what information s/he intentionally relied on to make the choice. It is worth noting that all of our subjects

were first-time encounters of the two websites, so their behavior was not biased by any of previous usages.

Each user's interactions with the website(s) including on-screen mouse moves and inputs were all automatically captured by a screen-recorder. After her/his choice was made, a post-study questionnaire was to be filled in, requesting the participant's overall decision confidence and purchase intention, followed by usability assessments of the website(s) s/he just used. A follow-up interview was then conducted and recorded to get her/his verbal comments w.r.t. what s/he liked and disliked most, and what s/he would like to be added or combined for better supports.

Materials

A summary of each website's provided searching facilities and product details was first made in Table 1, from which we can clearly see that Flickr CF mainly supplies popularity-based browsing/sorting, usage trend statistics, and community-shared photos, but lack of feature-based browsing/filtering tools (e.g., by price, megapixels, optical zoom, etc.), product-related recommendations (e.g. "shoppers who viewed this item also viewed …"), and full product specifications that Yahoo CF gives. One aim of our analysis was then to discover what facilities users consulted at their decision stages. In fact, researchers on consumer behavior indicate that a buyer tends to use two-stage processes to reach her/his decision, where the depth of information processing varies: initial screening of available products to determine which ones are worth considering further; in-depth comparison of selected products before making the purchase decision [3]. It was hence interesting to see whether/how social popularity info practically acted during the processes to help users achieve their final choice.

	Yahoo CF	**Flickr CF**
Popularity info and browsing/ searching facilities	Most popular products (e.g. "*Top Digital Cameras*"); Feature-based browsing and filtering facilities (e.g. "*Narrow Results*"); Searching with keywords ("*Shop for*"); Product-related recommendations ("*Shoppers who viewed this item also viewed*")	Most popular and brand popular products (e.g. "*Most Popular Cameras in the Flickr Community*", "*Top 5 xx Cameras in the Community*"); Popularity-based sorting (e.g. by "*# of items, avg. daily users, activity factor*")
Product detail page	Full specifications; Customer rates/reviews; Price comparison	Basic specifications; Usage trend this year; Photos taken with the product

Table 1. Comparison of the two sites' provided facilities and product details (at the time of our experiment).

RESULTS

Flickr CF Usage

To our surprise, all of participants used both websites as a combination to identify their target. 50% of them initially started with Yahoo and the other half began in Flickr CF. Tracing of their actions shows that the general two decision processes [3] (as introduced above) can be further refined into three stages: 1) to screen and select products for in-depth

evaluation; 2) to view the product's details and save it in wish list if near-satisfactory; 3) to compare candidates in the wish list and make the final choice. Accordingly, we measured the frequency of a facility that was used to assist the user in narrowing down to an interested product at the first stage, and the type of product information reviewed respectively at stages two and three.

Credibility of Product Popularity

It first shows that on average 9.67 products were selected to view details, among which 5.42 were first located in Yahoo, and 4.25 were from Flickr CF (*note*: both sites have these products). Figure 1 concretely illustrates where (or through which facility) the product was found (where the percentage was computed as the average application frequency). It can be therefore seen that the standard product searching tool (i.e., feature-based browsing/filtering facility from Yahoo) got highest 39.79% chance enabling the average user to obtain an interested product. The second and third winners come to Flickr CF's popularity-based sorting list (27.51%) and brand popular products (12.18%) respectively.

In comparison, Yahoo's popularity-based recommendations got much less successes (5.28%). Actually, there are only 2 users (out of 12) who consulted the popularity info in Yahoo, versus 9 participants accessing the popularity list in Flickr CF.
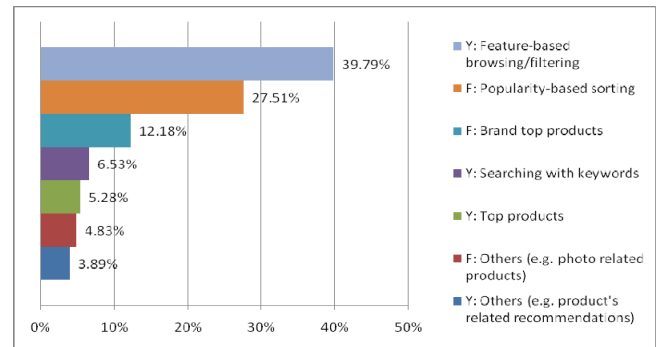

Figure 1. Chance distribution for the location of interested products (*Y* for Yahoo CF, *F* for Flickr CF)**.**

It then came to the question of why people used Flickr CF when the traditional shopping guide was also available, and what their motivations were behind. Post-interviews with all participants disclosed their similar mental activities. That is, their requirements were generally need-based at the start (e.g., looking for a camera that is "*easy to use*", "*easy to carry*", or "*better for photographing night scene*"). They commonly had 2 to 3 preferred brands in mind, besides hard constraints on price range and/or type (e.g., digital SLR). Their goal was hence to find a product best matching to these needs and constraints. For each brand, they first narrowed down to several candidates. At this point, if they had no exact domain knowledge about the brand, they tended to rely on "the most popular ones", since "*popularity is a suitable proxy to measure the product's quality when I am not familiar with a brand or uncertain about what I want*" (as revealed from one user's responses). It was also regarded as "*the best recommendation*" in this condition.

When being asked why they went to Flickr CF to obtain the popularity information, they replied that because it was more credible. They know that Flickr is a social photo-sharing site with millions of active users (e.g., "*I trust the information on the social forum.*" "*I trust Flickr's popularity information because of its large amount of users.*" "*Although this is my first-time using this website, the information sounds credible since it should be based on actual usages.*") They felt that the way of showing popular cameras based on users' uploaded photos is interesting and surprising at the first impression. They were soon used to it to not only look for products for in-depth evaluation, but also employ its usage trend statistics and user-shared photos as important factors to confirm the final choice.

On the contrary, the product popularity on Yahoo Shopping site (e.g., "Top Digital Cameras") was perceived "*less trustworthy*". As they noted, *"the 'top products' in Yahoo may be only dependent on users' clicks or for companies' promotion purpose." "Flickr is more neutral because it is a consumer-operated website. The information on Yahoo may be not so real since it is more commercial-oriented."* Therefore, it infers that users were inclined to trust the social media site against the standard shopping site, given that the former is seen to be free from commercial interests.

Product Detail Evaluation

As for which product page(s) users went to examine product details, we found 42.86% of products' evaluations were done on Yahoo (of the product's full specifications and customer rates/reviews), 30.44% on Flickr (with usage trend statistics and associated photos), and 26.70% on both product pages. Among all examined products, 45.82% were put into the average user's wish list. The page(s) evaluation respectively contributed 39.09%, 6.25% and 91.67%, to help establish the wish list (the % means the percent of products saved as candidates after the corresponding evaluation, see Figure 2.a). It hence implies that the combination of product details from both Yahoo & Flickr (i.e., the camera's specifications, reviews, plus its usage statistics and images) can mostly likely inspire a serious consideration. The correlation is indeed highly significant ($p < 0.001$) by Pearson coefficients. Another fact is that 91.7% (11 out of 12) users' final choice was from outcomes of such combinative review.

All users further did comparisons among their selected candidates before they made the final choice. In order to understand what features they mainly considered at this last stage, we analyzed pages that were visited near the end. It indicates that 66.7% (8 out of 12) users went to Flickr CF to compare candidates' usage trends or community photos, and 33.3% emphasized product specifications and reviews on Yahoo (see Figure 2.b). Their verbal confirmations additionally verified the factors' dominant effects on their final choice.
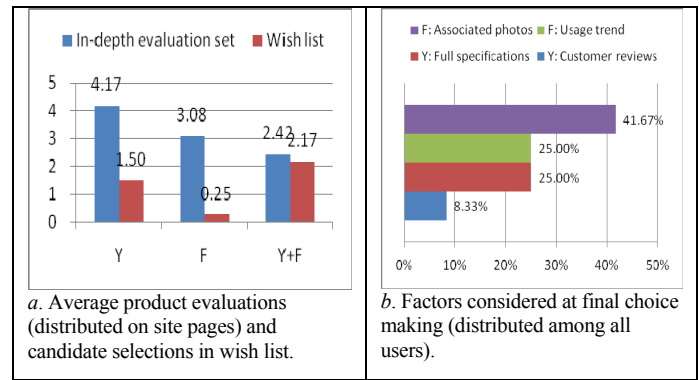

a. Average product evaluations (distributed on site pages) and candidate selections in wish list.

b. Factors considered at final choice making (distributed among all users).

Figure 2. Product evaluations (*a*) and final choice making (*b*).

Usability Scores

Thus, the above results experimentally demonstrate that Flickr CF, as a pure social popularity based product finder, was in fact frequently applied by participants at their different decision stages, in combination with the standard e-store Yahoo CF. Post-measurements of users' decision confidence and purchase intention further shows that 83.3% of them were confident that the product they "purchased" is really the best one and 75% truly intent to purchase it if given the opportunity. It hence reflects a high level of decision quality achieved by our participants after they freely used the two sites.

	Mean (St.d.)		p (t-test)
	Yahoo CF	Flickr CF	
"*The site is easy to use.*"	3.75 (0.87)	3.83 (0.72)	0.75
"*The site is useful to improve my 'shopping' performance.*"	3.75 (0.75)	3.75 (0.75)	1
"*I would be likely to use it if I had to search for a product in the future.*"	3.58 (0.67)	3.67 (0.65)	0.81
"*I would like to contribute if returning to the site.*"	3.33 (0.78)	3.75 (0.45)	0.14
Items that users wanted to contribute (the number of users out of all who had overall contribution intention to the site):	PR (3/6); PE (5/6); PP (4/6); RR (2/6);	PR (5/10); PE (3/10); PP (7/10); RR (4/10);	
	PR: product ratings; PE: product reviews; PP: product photos; RR: responses to other reviews		

Table 2. Measurements of users' subjective perceptions (each responded on a 5-point Likert scale from 1 "*strongly disagree*" to "*strongly agree*").

We also measured users' subjective perceptions with the interfaces they just used, including perceived ease of use, perceived usefulness, and return intention and contribution intentions. Since all participants used both sites, a within-subject *t-test* was performed to test the differences if any respecting these criteria. It turns out that Flickr CF obtained similar positive scores to Yahoo CF. Some criteria (such as intention to contribute) were even rated higher although the differences are not significant (see Table 2). As a matter of fact, 10 users explicitly indicated that they would like to contribute content once revisiting Flickr CF, relative to 6 who had such intention to Yahoo. Table 2 lists actual items that they were willing to contribute.

How to convince newcomers to become contributors has always been a challenge to social network sites [1]. The findings from our experiment interestingly suggest that stimulating users to practically experience the benefits of information shared in the social community (e.g., searching for a product based on the info) may likely promote their motivation to contribute (probably driven by the kindness to serve others with similar needs). The reason remains a topic for our future validation and exploration.

Users' Improving Suggestions

We finally collected users' opinions on interface elements and their improving suggestions. Most of them commented that it will be much beneficial to combine both websites into one. That is, Flickr CF can be adopted as a supplementary part to Yahoo (e.g., "*it does not perform like a professional e-commerce site, but the data is useful.*") They suggested that its popularity resources can be embedded into Yahoo to generate "the top products". In addition, the popularity-based sorting tool can be combined with standard feature-based browsing/filtering facilities, to support them when with various preference-certainty levels. Regarding product details, the usage trend statistics and associated photos from Flickr will be valuable references, in addition to static product specifications and customer reviews. Almost all participants were also impressed by the statistical graph that visualizes products' usage trends, perceiving it "*intuitive and easy to understand.*"

One user further suggested taking geographical distribution into account, such as separating users in Flickr community by their regions so as to distinguish product differences ("*one camera model was sold in Europe, but probably not in China*") and cultural impacts ("*people from the same cultural background may have common behavior*"). Another user proposed to add time dimension to compute product popularity, given that old models would be used by more users. He commented that "*popularity should better be compared between products that were released at the same time.*"

DESIGN IMPLICATIONS FOR FUTURE WORK

Although more and more attentions have been paid in recent years to developing social recommender systems through utilizing resourceful data from social media sites, most works have focused on objective algorithm accuracy, rather than assessing users' perceptions and true needs of social data in their decision making. As one of beginners, we contributed in this paper to particularly revealing the role of "product popularity" regarding how users perceived and employed it in searching for a high-risk product. The usability study of Flickr CF shows that most users perceived the "product popularity" suggested by it more credible than by a standard e-commerce site, because it is more dependent on a large community's real usages and less of commercial interests. The community information was also found to bring effects at a user's different decision stages. It not only contributed to assisting users in locating interested products, but also actively acted to help them establish wish list and make the final decision. Moreover, our users, who were all first-time encounters of Flickr CF, expressed positive acceptance scores on it, and more notably higher intention to contribute content to the site against to a normal shopping site.

All in all, according to the experimental results, we believe that the "product popularity" can be well integrated into an adaptive decision support to generate social recommendations, serving users who have unclear objectives at the start. It will induce positive influence on enabling users to be familiar with the product domain and identify candidates among the recommended products, if they trust them. Thus, for the development of a trustworthy social recommender, we suggest including the "product popularity" being originated from social media and connected to consumers' real usages. Furthermore, the popularity can be additionally customized to involve various contextual factors such as contributors' regional properties to dynamically map to the current user's situations. This study also discloses other kinds of product-related social data, like the camera's usage trend statistics and community photos, in guiding users to form a more complete choice confirmation. These data can be hence usefully combined with products' static descriptions to develop more intelligent tradeoff supports [6].

For our future work, we will be engaged in conducting studies to validate the above suggested findings across different product domains and systems. Our ultimate goal is to conclude effective design guidelines to benefit current e-commerce decision tools and recommender interfaces, so that they can optimally improve consumers' subjective perceptions and task performance.

REFERENCES

1. Burke, M., Marlow, C., and Lento, T. Feed me: motivating newcomer contribution in social network sites. In *Prof. CHI 2009*, ACM Press, 945-954.

2. Cialdini, R. B. and Goldstein, N. J. Social influence: compliance and conformity. *Annual Review of Psychology 55* (2004), 591-621.

3. Haubl, G. and Trifts, V. Consumer decision making in online shopping environments: the effects of interactive decision aids. *Marketing Science 19*, 1 (2000), 4-21.

4. Lazar, J., Meiselwitz, G., and Feng, J. Understanding web credibility: a synthesis of the research literature. *Found. Trends Hum.-Comput. Interact. 1*, 2 (2007), 139-202.

5. Olshavky, R. W. and Granbois, D. H. Consumer decision making: fact or fiction? *Journal of Consumer Research 6* (1979), 93-100.

6. Pu, P. and Chen, L. Integrating tradeoff support in product search tools for e-commerce sites. In *Proc. ACM EC 2006,* ACM Press, 269-278.