The Bigger Picture: The Use of Mobile Photos in Shopping

Maryam Tohidi, Andrew Warr

The Bigger Picture: The Use of Mobile Photos in Shopping

Maryam Tohidi, Andrew Warr

Google, Inc.
1600 Amphitheatre Parkway, Mountain View, CA, 94043

{mtohidi, andywarr}@google.com

Abstract. Mobile phones are becoming, if not already, an integral part of our lives. They have a wide range of applications, such as communication, gaming and commerce. Shopping in particular is a rapidly growing domain. Today, shoppers use their phones to make more informed shopping decisions by researching products and merchants, save money using price comparison, mobile coupons and daily deal apps, even purchase products directly on a mobile device. While mobile commerce and shopping apps are in the spotlight, one area that has received little attention is the role of the native capabilities of a mobile phone, such as the mobile camera, in the shopping process. This paper demonstrates the key role mobile photos play in the shopping process, documenting use cases, practices and pain points, and informing opportunity areas for mobile shopping applications and services.

Keywords: Mobile; Phones; Cameras; Shopping; Photos.

1   Introduction

In recent years there has been a steady rise in the use of mobile phones. At the end of 2012 an estimated one billion smartphones were in use worldwide [1]. The adoption of mobile devices and their affordances such as advanced computing capabilities and connectivity have enabled new areas of application; one such area is mobile-supported shopping.

Academic research on mobile shopping has primarily focused on mCommerce --- shopping for and purchasing items using a mobile device [7]. Hillman et al. [3] studies the everyday routines of regular mobile device shoppers and identifies a large variety of mobile shopping activities, such as looking for products, comparing prices and purchasing items. Whilst such research has deepened our understanding of mCommerce, little in-depth research has considered the role of mobile phones when shopping in the real world.

According to US census data, eCommerce - a superset of mCommerce - accounted for only 5.5% of all retail sales in the US in 2013 [8]. With a large majority of com-

merce still taking place offline, it is important to understand the role of mobile devices in supporting shopping in physical stores. Pew Research reported that 6 in 10 mobile phone owners used their phone inside a physical store for assistance or guidance on a purchasing decision [6]. Nielsen and Smith [5, 6] demonstrate the prominence of several common activities such as calling a friend or family member for advice, looking up reviews, looking up price, locating stores and researching products, to name the most common activities. However, some key use cases for mobile phone usage in-stores were omitted in these surveys, resulting in a lack of awareness of their importance.

One area that has received little attention in the mobile shopping literature is the use of mobile phone photos to support shopping. Häkkilä et al. [2] have examined the use of camera phones in general, identifying that the most common functional (i.e. task driven) use for mobile phone photos was to support shopping activities.

In this paper, we explore the application of mobile phone photos in supporting shopping activities and present findings from a quantitative survey as well as a qualitative analysis of photos, identifying motivations, use cases and pain points.

2 Quantitative Research

To examine the relative importance of shopping-related mobile phone photos we conducted two surveys in November 2012 and February 2013.
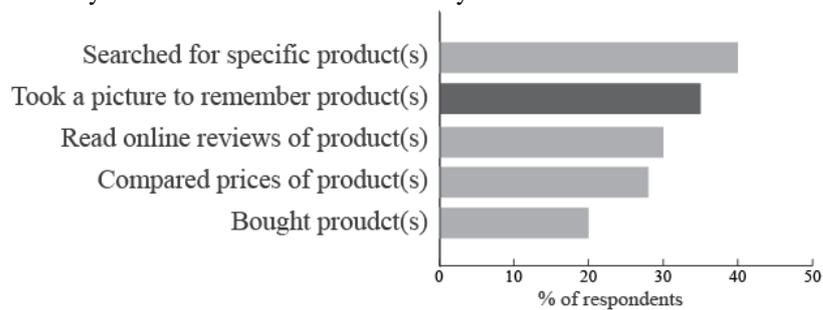
Fig. 1. Survey 1, top mCommerce activities.
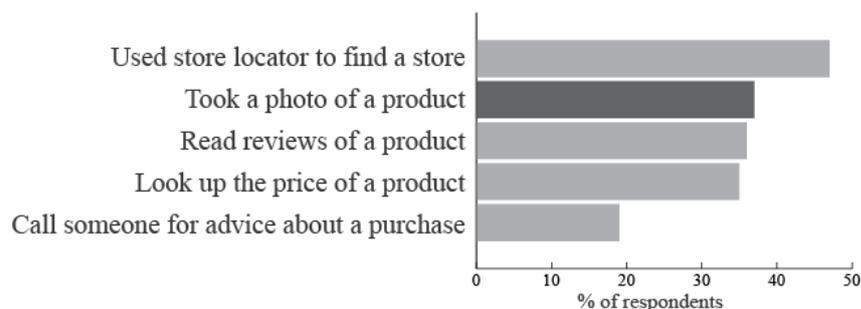
Fig. 2. Survey 2, top in-store mobile shopping activates.

In the first survey, 2005 respondents, representative of the US population of online users, answered the multiple choice question 'Which of the following shopping activities did you do on your mobile phone in the past 2 weeks?' The choices included the most frequent *mCommerce* activities identified in previous research [3, 5], as well as 'took a picture to remember a product'. From those who had done any shopping activities on their phones (503), taking a picture to remember a product ranked among the top.

In the second survey, 1339 respondents, representative of the US population of online users, answered a similar question; this time the choices included the most frequent *in-stores mobile shopping activities* identified in previous research [5, 6], as well as 'took photo of a product'. From those who had done any shopping activities on their phones (360), taking a photo of a product ranked among the top again.

Our surveys showed that taking shopping-related mobile photos is comparable to mobile shopping activities previously identified as most frequent.

3 A Study of Shopping Photos

To understand how mobile photos are used in shopping we collected real examples of shopping-related photos. We posted requests on social and miscellaneous mailing lists at a large US technology company, asking recipients to browse their mobile photo gallery for photos taken related to a shopping activity in the last month, and to email us such photos accompanied by a caption stating why they took the photo.

We received a total 285 photos and associated captions from 91 respondents (58% female). Their ages ranged from under 20 to over 50, with a median age range of 30-39 years. Respondents were from across the US, representing a range of jobs, both technical and non-technical.

Furthermore, we asked the participants to elaborate on their practices and pain points around taking these photos in a follow up survey. 80 of the 91 responded to this survey.

3.1 General Observations

As suggested by previous research [2], many of the photos in our study were taken as a memory-aid. Since their mobile phones are almost always with them, participants used their phone as a repository of to-dos, useful references, reminders and evidence related to their shopping. One participant said *"I usually forget the grocery list but not my phone. So I just take a photo of it."* Another participant took a photo of a receipt, *"so that I had the receipt saved in case I lost it."* Since their primary purpose is functional [2, 4], little attention is given to the composition, lighting and other artistic values of these photos.

We also saw evidence of 'bursts' [2] of photos, taken of similar products, related to the same shopping purpose. For example, one participant had taken 8 photos of floor lamps to show her boyfriend and another participant had taken 7 photos of TV options he had seen at Costco to research later. In our follow up survey 61% of respondents

confirmed that they have taken at least one burst of 3+ photos related to the same shopping intention.

3.2 Photo Analysis

We took a bottom-up approach to analyzing the photos based on what was pictured (i.e. content) and why they were taken (i.e. intent). Two researchers iteratively developed a coding scheme covering these dimensions. Before coding the entire collection, a random sample of 10% of the photo/caption pairs was coded by two independent judges. The coding scheme had an inter-judge reliability of 80%. Table 1 presents these codes.

Content codes	# (%)	Intent codes	# (%)
Full product	154 (54%)	To remember	146 (51%)
Label	121 (42%)	To share	124 (44%)
Price	68 (24%)	To consider	102 (36%)
Something owned	45 (16%)	To buy	96 (34%)
Barcode	40 (14%)	To inspire	44 (15%)
Partial products	35 (12%)		
Self	10 (4%)		
Shopping list	9 (3%)		
Receipt	7 (2%)		
Advertisement	7 (2%)		

Table 1. Coding scheme, frequencies and % of all photos

3.3 Content

Physical Products: Taking a photo of the actual product was most common, with 54% of photos showing the full product (Figure 3a), and an additional 12% showing a partial product (Figure 3b) - often a close-up focusing on a specific aspect of the product, such as the texture of a scarf. Furthermore, taking a photo of a product already owned accounted for 16% of photos. (Figure 3c)

Fig.3. Examples of shopping photos

Information about Products: Labels were the 2nd most common content type, accounting for 42% of photos (Figure 3d). Labels included textual or numeric information describing the product (e.g. wine bottle labels, clothing labels and nutritional information). Price and barcodes were also quite commonly pictured, appearing in 24% and 14% of photos respectively (Figure 3e and 3f).

We also saw photos of oneself (often trying on, or setting context for a product seen in a physical store), shopping lists, receipts and advertisements.

3.4   Intent

The accompanying caption described the intention behind taking a photo. Analyzing these captions, allowed us to categorize the primary motivations (Table 1). Shopping photos were taken as a means to remember (51%), share (44%), consider (36%), or buy a product (34%), or to serve as an inspiration for a future purchase (15%).

These intentions often overlapped (shown in Table 2), for example, from the photos taken with the intention 'To Remember', 49% were also intended 'To Buy', and '29% 'To consider' a product.

	To share	To consider	To buy	To inspire
To remember	10%	**29%**	**49%**	9%
To share		**52%**	9%	**22%**
To consider			5%	1%
To buy				**14%**

Table 2. Overlap of intentions, highlighting the most common

4   Discussions

Investigating the intent behind the photos allowed us to drive the common use cases in which mobile photos support shopping.

Just over half (51%) the photos were taken with the intention to remember something, helping with the *organizational aspects of shopping.*

Shopping List: 49% of photos taken with an intent 'To remember', were also intended 'To buy' a product. These photos served as visual shopping list.

Shortlist: 29% of photos taken with an intent 'To remember', were also intended 'To consider' a product. These photos, often taken of similar products, helped keep a shortlist of products under consideration, to research or compare later.

Archive: Another important use case of photos taken 'To remember' was archiving evidence or important references, such as receipts and shipping labels.

The *social aspect of shopping* is another important dimension supported by photos. 43% of all photos were taken with the intention to share with someone. These photos were often shared through MMS, email, or shown to someone in person.

Second opinion: The primary reason for sharing a photo was to get feedback on a product under consideration (52%). These photos were often shared with a spouse, a

close friend or family member, asking for a yay or nay response. There was only one example of sharing with a group to get collective feedback for a mutual purchase.

Hint, hint: 22% of photos taken with an intent 'To share', were also intended 'To inspire' someone else to buy something. For example, one participant sent a photo of her wedding band to her husband as a reminder for her anniversary gift.

Saw this, thought of you: Another reason for sharing photos was to maintain or enhance personal relationships. For example one participant shared a photo of a beer bottle label featuring a werewolf with a group of friends playing a computer game fighting werewolves. Humor also played a role in this type of sharing. One participant took photos of owl figurines to send to a friend who is scared of owls. Another posed for a photo with an infant outfit held in front of her to share with her family for a laugh. This was the only category of sharing, where group sharing was very common.

Other sharing scenarios included expressing frustration with a bad shopping experience, providing proof of a purchase, or setting context for product recommendations.

4.1 Mapping of Content and Intent

A mapping of photo intent against photo content illustrates some of the reasons why people took photos of the different aspects of a product. In Table 3, each cell indicates the percentage of photos taken of a content type (row), with a given shopping intent (column). Note than since 'To remember' almost always went hand-in-hand with another intention that was more specific to shopping, we have simplified this graph by focusing on the other 4 intentions.

	To share	To consider	To buy	To inspire
Full product	**62%**	**46%**	21%	16%
Label	30%	31%	**43%**	15%
Price	34%	**49%**	29%	9%
Something owned	24%	0%	**78%**	16%
Barcode	5%	38%	**58%**	10%
Partial product	29%	17%	**49%**	9%

Table 3. Mapping photo intent against content – highlighting the most common

4.2 Inferring Intent from Content

Table 3 highlights usage patterns that could inform our ability to infer shopping intent from the photo content alone. As show above, when the photo shows a full product, the most common shopping intentions are to share the photo with someone else (62%), or to consider the product further (46%). Photos focused on partial products however were more often tied to buying (49% compared to 21% for full product).

Taking a shopping-related photo of something they already owned, was very often tied to a buying intent (78%) in order to replace or complement their existing product.

Similarly, when the primary content of the photo was a product label or barcode, there was often a buying intent (43% and 58% respectively). Price tags on the other hand, tended to indicate a product under consideration (49%).

4.3   From Inspiration to Consideration to Purchase

The shopping stories (captions) shared with us often spoke of longer term purchases, where the photos connected the dots between different phases of shopping. *"I've been shopping online for boots for a couple of months, and I'd been showing my husband a lot of pictures. He sent me several [mobile] photos of boots he saw on two shopping trips, while he was out shopping for something else. We followed up by text/phone. We ended up buying the red boots."*

Inspiration-related photos were often taken of objects seen in the real world (e.g. *"a lamp I liked in a restaurant"*), ads or magazines (e.g. *"lighting feature in a design magazine I want to DIY"*), and collections of products (e.g. *"a nursery room in Pottery Barnes"*). 61% of inspiration-related photos were to be shared with someone else, either to suggest gift ideas (e.g. *"he might like this for Christmas"*), or as a self-appointed personal shopper, curating based on the recipient's interests or needs (e.g. *"Cadbury mini-eggs are in stores already! I know you love them"*).

Consideration-related photos were often taken in 'bursts' to record references to products that the shopper intends to research or compare. Furthermore, consideration and sharing often went hand in hand. For example, a group of bridesmaids took several photos of dresses to send to the bride for her consideration. Apparel and furniture were the 2 most common product categories that participants shared with others to get a second opinion.

Purchase-related photos were centered around specific product(s) to buy later, either online or in-store. About half of these photos were taken in a store to buy online later, *"Liked this area rug at Home Depot but in-store inventory was frayed. I went home and ordered it online"*. In many cases there was a hope to find the product at a cheaper price, *"Ski Jacket that was on sale at REI - I wanted to see if I could find a better price online."* There were also photos to help future in-store purchases, such as photos of shopping lists and recipes.

4.4   Pain Points

Although shopping-related photos are often taken as a memory aid for future actions, it is not uncommon for the photos themselves to be forgotten. *"I took these pictures to see whether that item has good reviews. Then forgot about it and took no action."* In the follow-up survey, 83% said they have taken at least one photo with the intention to refer to it later, but they forgot to do so. Shopping-related mobile photos tend to stay in the mobile gallery, among other photos, making them harder to remember, find and organize over time. (72% said they don't go back to delete the shopping related photos from their mobile gallery.)

When asked what the biggest challenges regarding these photos were, the primary pain points identified in the follow up survey were remembering to go back to the

photos (59% of respondents), finding a photo when you need it (53%), finding the product at a later date (33%).

5 Areas of Opportunity

Our study suggests that, while there is plenty of usage and applications for mobile photos in the shopping process, there is room for better connecting the dots between the two mediums. The biggest challenge for users is that they forget the photos, or have a hard time finding them when needed. There seems to be an opportunity area for tools to help identify, organize and surface these photos at the right times and places so that they can better support shopping.

6 Conclusions

This paper highlights the importance of mobile photos in supporting shopping activities, an area previously overlooked in related research. We have proposed a taxonomy for the content and intent of shopping-related photos, identified key use cases, common pain points and suggested an opportunity area for further development.

References

1. Bicheno, S. Global Smartphone Installed Base Forecast by Operating System for 88 Countries: 2007 to 2017.
   http://www.strategyanalytics.com/default.aspx?mod=reportabstractviewer&a0=7834. Accessed June 2013.
2. Häkkilä, J., Huhtala, J., Sarjanoja, A. & Schmidt, A. 2012. Price tags, maps, recipes: mobile phone photos for functional purposes. Proc. of NordiCHI '12. ACM, New York, NY, USA, 41-44.
3. Hillman, S., Neustaedter, C., Bowes, J. and Antle, A. 2012. Soft trust and mCommerce shopping behaviours. Proc. of MobileHCI '12. ACM, New York, NY, USA, 113-122.
4. Kindberg, T., Spasojevic, M., Fleck, R. & Sellen, A. 2005. The Ubiquitous Camera: An In-Depth Study of Camera Phone Use. IEEE Pervasive Computing 4, 2, 42-50.
5. NielsenWire, Mobile Devices Empower Today's Shoppers In-Store and Online. http://www.nielsen.com/us/en/newswire/2012/mobile-devices-empower-todays-shoppers-in-store-and-online.html, Accessed June 2013.
6. Smith, A. In-store Mobile Commerce During the 2012 Holiday Shopping Season. http://pewinternet.org/Reports/2013/in-store-mobile-commerce.aspx. Accessed June 2013.
7. Stafford, T., Gillenson, M. Mobile Commerce: What it is and What it Could be, Communicaiton sof the ACM, 46(12), ACM Press 2003.
8. U.S. Census Bureau Report, Quarterly Retail E-Commerce Sales. http://www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf, Accessed June 2013.