Journal of Business Research xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Journal of Business Research

journal homepage: www.elsevier.com/locate/jbusres

How does location based marketing affect mobile retail revenues? The complex interplay of delivery tactic, interface mobility and user privacy

Syagnik Banerjee[a,*], Shichun Xu[b], Scott D. Johnson[c]

[a] Marketing, 2120 Riverfront Building, School of Management, University of Michigan –Flint, 1 Riverfront Center, Flint, MI 48502, United States
[b] Marketing, 2139 Riverfront Building, School of Management, University of Michigan –Flint, 1 Riverfront Center, Flint, MI 48502, United States
[c] School of Management, 2213 Riverfront Center, University of Michigan –Flint, 1 Riverfront Center, Flint, MI 48502, United States

ARTICLE INFO

Keywords:
Mobile
Retail
Location based marketing
Inbound-outbound

ABSTRACT

Location Based Marketing (LBM) increases relevance of placed advertisements by increasing awareness of product offers and availability in the consumer's proximity. However, depending on how it is executed, such advertising can be perceived as intrusive, irritating, or a violation of consumer's privacy. Existing research does not offer clear directions for retailers, who are keen to know of LBM's effectiveness on sales. In this paper, authors investigate the effects of LBM on application (app) driven revenues of 116 major mobile retailers from around the globe. In particular, we examine the contingency effects of the roles of device as well as privacy needs of the brand audience. Findings reveal that effects of LBM on app-based revenues vary by delivery tactic (inbound vs. outbound), interface mobility (Low: Tablet vs. High: Phone), and user privacy needs (Privacy-seeking Android users vs. Privacy-oblivious Apple users). Overall, this research identifies critical factors for retailers to consider in order to best monetize their location based efforts. Contributions of the analysis and managerial implications are discussed.

1. Introduction

The massive shutdown of retail stores in the US in 2017, amid an otherwise healthy economy, adds yet another strong piece of evidence of how consumers are increasingly switching to non-traditional channels for purchases (Thompson, 2017). Recent trends show that sales of brick-and-mortar stores such as Macy's, J.C. Penny's and Target are on the decline (Low, 2017), while online sales (e.g. Cyber Monday) are rapidly increasing (Barron, 2017). Ramping up retail effort to compete in this new channel, mobile marketing (m-marketing) has advanced impressively in recent years (Bart, Stephen, & Sarvary, 2014). Among the emerging m-marketing techniques is location-based marketing (LBM) (Ketelaar et al., 2018). LBM is achieved by collecting user location and reaching them with relevant offers in geographic proximity. As such, it is also known as proximity marketing. Location-targeted mobile advertising spending is forecasted to grow from $9.8 billion in 2015 to $29.5 billion in 2020 (Beck, 2017).

Retail, arts and entertainment are dominant users of LBM, especially since sports bodies like National Football League, National Basketball Association, Major League Basketball, and National Hockey League use it for event-related promotions. Riding on a variety of technology platforms including beacons, GPS/ geofencing, Wi-Fi, Near Field Communications, Audio, QR Code and LED based services, more than 5 million sensors are deployed globally, a number that is expected to reach 400 million by 2021 (ABI Research, 2016). Existing literature has examined the impact of m-marketing on both retailer performance and consumer behavior (Mpinganjira & Maduku, 2019; Yang, Kim, & Yoo, 2013). However, findings reveal a mixed impact on consumer acceptance and retailer revenues. Some studies have found m-marketing offers great value to consumers due to the unique advantages of mobile technology such as ubiquity, convenience, localization, and personalization (Clarke, 2001; Gao, Rohm, Sultan, & Pagani, 2013). Some others have found that consumers' attitude toward m-marketing messages and tools are far from being unanimously positive. In particular, Watson, McCarthy, and Rowley (2013) and Ström, Vendel, and Bredican (2014) found that consumers consider m-marketing communications from companies irritating and intrusive as they view mobile handhelds as being personal and private. Furthermore, the perceived usefulness of such advertising tools are also correlated with consumers' privacy concerns with a long lasting effect (Palos-Sanchez, Saura, & Martin-Velicia, 2019). In fact, despite a 80% overlap between marketers who run mobile ads as well as geo-targeted ads (xAd, 2015), some global brands deliberately avoided location targeting due to data accuracy, campaign performance and their inability to attribute or measure

* Corresponding author.
E-mail addresses: syban@umich.edu (S. Banerjee), shichun@umich.edu (S. Xu), scotjohn@umich.edu (S.D. Johnson).

https://doi.org/10.1016/j.jbusres.2020.02.042
Received 25 November 2018; Received in revised form 16 February 2020; Accepted 18 February 2020

success. Similarly, firms capturing and collecting user location information for targeting them or reselling their information have faced lawsuits for violating privacy and security.

Given the conflicting findings in the literature for effectiveness of m-marketing in general, one would expect the effectiveness of such a specific technique as LBM to be even more complicated, as they amplify the problem of consumer privacy and security. Retailers find it challenging to understand whether deploying location based tools for marketing their offers drive greater or lesser revenues. Hence, a study is needed to examine the contingent factors of LBM strategy on sales. This exploratory study sheds light on what factors contribute to LBM revenues by disentangling the different components of ad delivery, i.e, marketing tactic (inbound-outbound), interface mobility (tablet – phone) and user differences (Android users -Apple users) chosen to deliver the ads. Prior research has documented the impact of device types and consumer characteristics on the effectiveness of mobile marketing tools (Bhatnagar & Papatla, 2019; Jang, Kitchen, & Kim, 2018; Wagner, Schramm-Klein, & Steimann, 2020). As such, it is valuable to understand the current paper's three contributions. First, we test effects of inbound-outbound LBM on *real* firm level in-app revenues of mobile retailers. Past research has mostly tested willingness to purchase in survey and scenario based methods, which leaves a gap between perceived willingness and actual purchase behavior. Second, we demonstrate the role of advertising interface (phone or tablet) on LBM effectiveness on in-app sales. Third, we demonstrate the contingent role of user differences (privacy oblivious vs. privacy seeking users), who are associated with different brands of device (Android or Apple), and their communication preferences.

2. Conceptual development

Location based advertising (LBA), a subcategory of LBM, integrates mobile phones with pinpointed consumer locations with the help of wireless networks, Bluetooth, GPS, cell phone towers or beacons to serve advertisements and other promotional materials to phone users. It can be served through both web-based as well as in-app advertising interfaces. Searching google for "Asian restaurant" drives prompts like "near me" appearing as subtext in the search bar and awareness of restaurants within proximal geographical distance can be an outcome of location based marketing on the mobile web. Similarly, using a branded app installed by the manufacturer of one's mobile device can help utilize In-store discovery features to explore offers when inside Target or Walmart, exemplifying in-app advertising (Geddes, 2015). While web-related tools affect web-related revenues, in-app advertising influences purchases made through the app. Location unlocks multiple rich layers of data, such as weather, local events, and demographics. Analyzing the information allows marketers to get a holistic view and to monitor a situation at a certain location in real-time. Selecting and blending these data layers into marketing message enables creation of dynamic, on-the-go audiences with more relevant information and thus increase the perceived usefulness of the marketing message (Ketelaar et al., 2018).

While it is expected that availability of products and offers close by will be more relevant and enticing to shoppers, existing literature report mixed findings regarding the impact of such location-based initiatives. The increased relevance drives perceived usefulness, higher purchase intentions and positive attitudes towards both the ads and the advertised brand (Gao et al., 2013). However, location-based marketing messages also signal surveillance to consumers which enhances perceived intrusiveness and irritation (Gupta, 2013) resulting in negative attitudes towards the advertised brand (Ketelaar et al., 2018).

Prior literature suggests that proximity is not the only criteria for higher response rates when consumers are targeted in nearby locations. The physical environments, location characteristics, time, weather and activities they are immersed in can affect their mindsets, perceptions, willingness to travel and effective coupon redemptions and conversions (Banerjee & Dholakia, 2008; Grewal, Bart, Spann, & Zubcsek, 2016; Li, Luo, Zhang, & Wang, 2017; Molitor, Reichart, & Spann, 2016). While factors influencing coupon redemption or promotion effectiveness have been studied in previous research, few papers have quantified the effect of this tool on retail revenues. This remains an important question to be answered as it raises the issue about whether retailers' experiments with new technological tools can actually drive up sales revenue as they expected. This is a critical issue for marketers because mobile as an interface has become integrated within customer relationship management. With the decreasing trends of face to face physical interactions between customers and retailers or providers, trust is a critical component of the stability of technologically diffused relationships (Mukherjee & Nath, 2007). In order to allow effective customer participation in the relationship, the rules of engagement must moderate interactions so that marketers' efforts towards intimacy are not viewed as intrusion by consumers (O'Malley, Patterson, & Evans, 1997). Fundamentally, the effectiveness of a LBM message depends on three factors that alter consumer perceptions. First is the type of message. Second is the type of customer and their preferences. Third is the type of channel or interface the message appears on. As a result, we explore LBM in the context of the interdependent roles of (1) inbound versus outbound messages on (2) privacy-seeking versus privacy-oblivious consumers who (3) receive communication messages over tablets versus phones.

3. Message delivery tactic: inbound vs. outbound advertising

Inbound or pull advertising is designed with information sought out by consumers because of perceived information value. In contrast, outbound or push advertising is a marketer-dominated one way flow of intrusive messaging to the consumer. As businesses evolved from brick-and-mortar to click-and-mortar and completely web-based retailers, the extent to which their marketing was internet-integrated started to vary (Bleoju, Capatina, Rancati, & Lesca, 2016). The completely online retailers used inbound marketing including blogs, content marketing, social media and search engine optimization to attract or "pull" customers to their web-based platforms (Opreana & Vinerean, 2015). Their focus was on memorable content creation. However, since click and mortar businesses were invested in physical infrastructure, they deployed outbound tactics, focusing on both design and "pushing" content through print, TV, radio and mobile channels synchronized to their physical locations to attract and engage foot traffic (Vernuccio & Ceccotti, 2015). This is why LBM was initially designed as push notifications, or outbound marketing. Marketers assumed that being proximity based, LBM is more relevant and should demonstrate higher receptivity to consumers. However, inbound and outbound LBM tactics differ significantly in terms of consumers' consent to receive such messages, and research demonstrated that consumers evaluate LBA negatively if they had not previously consented to receive such advertising (Tsang, Ho, & Liang, 2004). LBM inbound tactics such as search marketing and displays are delivered to the consumers' attention only when the information is explicitly requested for, and when the consumers initiate the search query based on products they have preferences for. A simple example is when a consumer who walks into a shopping mall and searches for deals related to specific categories in the stores surrounding her on her mobile device. In contrast, outbound LBM is controlled by marketers and retailers where the information is pushed to consumers within a proximity radius. In the classification of inbound and outbound marketing techniques, Bleoju et al. (2016) labeled "intrusive online ads" under the category of outbound techniques. Going back to the example, retailers send marketing messages to all devices that enter the mall assuming that one who has entered a shopping mall will necessarily be interested in offers available in their vicinity. However, forced information exposure through a personalized mobile interface could be perceived as intrusive (Banerjee & Dholakia, 2008) and can drive people away, or delay sales.

4. Tablets versus smartphone: Interface mobility

Mobile advertising effectiveness is known to depend on interface design of hand-held devices as well as the usage context (Xie, Zhao, & Xie, 2013). Device types affect consumers' attitude towards m-commerce mobile applications (Bartikowski, Gierl, & Richard, 2018; McLean, Osei-Frimpong, Al-Nabhani, & Marriott, 2020). Consumers' perception and shopping experience are dependent on the capability of the e-channel touchpoints (Wagner et al., 2020). Device interfaces are associated with different information search styles and shopping behaviors (Bhatnagar & Papatla, 2019). Interfaces matter in location-based advertising due to four aspects related to regular habits and purpose of device usage. These aspects include screen size, context and ubiquity, roles in the shopping process, and transaction volumes.

4.1. Screen size

Consumers value e-commerce as a way to escape the inconvenience of physical store visits. Despite the flexibility, connectivity, and convenience associated with mobile devices, the small screen size and limited display capabilities continues to increase search costs for consumers (Huang, Lu, & Ba, 2016). Screen sizes affect consumer's attitude toward both the mobile commerce app and the site, and consequent purchase intentions, often reducing advertising effectiveness when directed towards smaller screens (Bartikowski et al., 2018; McLean et al., 2020). The difference in size influences consumers' attention to the message (Reeves, Lang, Kim, & Tatar, 2009). Studies also found that screen size difference affects consumers' selectivity to shop for different types of products (Chae & Kim, 2004; Huang et al., 2016). Ozok and Wei (2010) found that some shoppers prefer stationary devices when making purchases and the mobile device is only complementary in nature to desktops rather than a direct alternative (Groβ, 2015). Hence the differences in screen size may affect not only portability and where the device is used, but also how the device is used.

4.2. Context and ubiquity of use

Prior studies have observed that smartphones are used more ubiquitously than tablets by consumers. The dimensions of consumer ubiquity (Banerjee & Dholakia, 2013) specify a. location of use, b. time of use, c. social context of use and d. tasks used for. Smartphones are used in both indoor as well as outdoor environments, whereas tablets are used more frequently indoors. Location use patterns demonstrate that the only space with higher use frequency for tablets over smartphones is the residential living room (Etter, 2013). Furthermore, separating out days and times of device use reveal that tablets are used more towards the end of the day than smartphones (Arthur, 2011), and peak on weekends relative to smartphones (Young, 2014). Additional differences between the two devices include personal use of smartphone vs. shared use of tablets; higher frequency of smartphone use; longer length of usage of tablets; smartphones favored in emotional settings over tablets; and more fixed position of tablets (Interaction Design Foundation, 2016). Overall, it is fair to observe that maximum usage of tablets is concentrated in evenings and weekends around users living rooms of their residences, with use shared among family members. In comparison, smartphone use is more personal and ubiquitous. Thus, it is reasonable to expect that unsolicited messages sent over the smartphone will be more likely perceived as a violation of personal privacy than those delivered over tablets.

4.3. Roles in the shopping process

The devices play different functions and roles in the shopping process. Among US consumers, smartphones are more often used on the go to locate stores, check prices, and utilize mobile couponing. Tablets are used more frequently for games, entertainment, reading, and reviewing due to greater visual acuity (Interaction Design Foundation, 2016). Conversion rates in online purchases are known to change when customers switch between different types of devices (De Haan, Kannan, Verhoef, & Wiesel, 2018).

4.4. Transaction volumes

Early studies reported that online sales via tablets were almost 50% higher than that of smartphones (Gardner, 2012). This was partly because of the role played, as described above, and because technologically smartphones were less equipped with friendly user interfaces to accommodate easy browsing and transaction related functions. Currently, user interfaces have improved the ease for transactions via smaller phone screens, and globally, smartphones demonstrate marginally greater contribution to shopping revenues than tablets, though patterns vary across countries. Based on 2015 Q1 and Q2 figures, countries like Japan, South Korea and Brazil generate the dominant majority (70–95%) of e-commerce via smartphones, whereas others like France, Germany, Netherlands and Russia generate 55–65% from tablets. In USA, over 60% of mobile transactions are generated through smartphones (Criteo, 2016). Overall, the greater portability, convenience and effective mobility of using the smartphone in multiple locations, over the tablet, enables shoppers receive outbound marketing, access inbound offer-related content and redeem them as well inside retail stores. At the same time, being a more personal rather than shared device, smartphones as advertising interfaces also evoke privacy concerns.

5. Android vs. apple customers: user privacy needs

These installed apps help schematize perceptions as well as expectations of the consumer. By presenting information organized in an order to exhibit attribute preferences, apps make it easier for consumers to demonstrate their divergent preferences by choosing to accept or reject marketing stimuli. Studies of differences between general e-commerce and m-commerce, and review of consumer attitudes and behaviors in m-commerce such as Alnawas and Aburub (2016) suggest that tools in the apps need to match with individual needs and gratification-seeking motives to be effective. When retailer intentions and consumer motives mismatch, consumers will not only fail to acknowledge the benefit of those tools but even find them intrusive and irritating (Banerjee & Dholakia, 2008; Ström et al., 2014; Watson et al., 2013). Persaud and Azhar (2012) as well as Jih and Lee (2004) emphasize the importance of aligning m-marketing tactics with customer lifestyles to achieve positive outcomes. When the m-marketing technique or tool fits well with the needs of its audience, consumers' motivation and willingness to purchase through mobile devices are higher (Groβ, 2015). On similar lines, Shankar, Venkatesh, Hofacker, and Naik (2010) compared three segments of consumers (millennials, road warriors, and concerned parents) to demonstrate that different groups adopt mobile technology for different purposes, exhibiting different attitudes toward m-marketing messages.

5.1. Situated versus ubiquitous orientations between brands

It is thus reasonable to expect that the effectiveness of the mobile tools largely depends on the "situated" or "ubiquitous" orientation of the target audiences (Banerjee & Dholakia, 2013). Situated users are more sensitive of their physical surroundings and concerned about privacy, whereas ubiquitous users are more addicted to their devices, and tend to shop more through them on-the-go. Studies conducted over the last few years reveal that iPhone and Android users differ in similar ways. Past research by Hunch (Smith, 2011a), Jumptap (Smith, 2011b) and Telenav (Gilbert, 2011) have found that Android and iPhone users in the USA varied by location/state, political orientation, and personality types. iPhone users were more likely to be women over 35 years

old, politically liberal optimists, extroverts (Scribner, 2016), self-described "high-maintenance" individuals, leaders, and were more willing to spend money on in-app purchases (Sinicki, 2016). Android users were more likely to be men, ages 18–34 who lean to the right politically, pessimists, introverts, with a preference for saving their money, pet owners, and later adopters of new technology. The difference in introversion-extroversion implies Android users may be more privacy-sensitive, and less receptive to push notifications and contextual advertising. As consumers' need for privacy increases, so do the perceived intrusiveness and attitude towards mobile ads, (Mpinganjira & Maduku, 2019). Also, iPhone users seem to demonstrate greater addiction to their phones, more willingness to sacrifice face to face contact in social situations in order to remain connected to their phones and higher willingness to pay for mobile app downloads. Hence, based on the three outcomes of (a) phone addiction and willingness to sacrifice face-to-face interactions, (b) privacy sensitivity and (c) willingness to pay, Apple users are likely to be more ubiquitous consumers than Android users (Banerjee & Dholakia, 2013), and retailers can expect more positive responses to push-based advertising from Apple user apps and devices than Android. These iPhone versus Android user distinctions would benefit from additional empirical evidence, yet patterns of findings across multiple studies do suggest a potentially meaningful approach to market segmentation.

Past research has established the importance of studying the fit between message and task in consumer's online shopping behavior (Hong, Thong, & Tam, 2014). Message content and screen size interactions were also analyzed in past literature (Reeves et al., 2009). Our study expands the scope of the investigation by incorporating user privacy needs, interfaces and delivery to build a holistic understanding of how marketing strategies can be best implemented to achieve desired goals.

6. Data collection, methodology and analysis

In order to empirically examine the contingent effects of the type of message, type of devices, and the brands of apps on LBM messages on mobile sales, we compiled a database of 116 top mobile retailers from multiple acquired sources. These retailers cover a wide range of product categories. Table 1 gives a summary of some descriptive statistics of the sample product categories. Almost 36% of the merchants were in the apparel and accessories business, mass merchants at 18%, computers and electronics at 6% and houseware-furnishings and sporting goods being at 5% and 6% respectively. The overall mobile revenues (total of web and app-based revenues) ranged from a mere $990,000 to $6.24 Billion. The database included information related to the use of different LBM tools which were coded as dichotomous variables (available vs. not available), and was combined with a separate database of desktop site characteristics for the firms present in the list. Data related to 40 variables were collected for each retailer, including mobile revenues by different channels, firm characteristics, desktop presence, traffic, number of unique visitors, types of apps and tools deployed by the firm, as well as devices and brands they were deployed through.

Since retailers in the sample varied on a wide variety of parameters, we controlled for several factors including context and background characteristics, as well as marketing tools deployed through app-directed interfaces. Context includes retail merchandise categories, types of business (retailer chains, consumer brand manufacturers vs. web-only, catalog retailers) and location (US vs. non-US). App-interface directed tools included text messages, alternate images, HD Images, mobile exclusive deals, native checkout, and optimized deep links.

Table 1
Retailer sample descriptives.

Retailers (percentages) by Product Category	
Office Supplies	1.72
Flowers/Gifts	4.31
Sporting Goods	6.03
Specialty	2.59
Apparel/Accessories	36.21
Computers/ Electronics	6.03
Hardware/Home Improvement	3.45
Health/Beauty	3.45
Housewares/Home Furnishings	5.17
Toys/Hobbies	1.72
Mass Merchant	18.10
Food/Drug	2.59
Jewelry	2.59
Books/Music/Video	3.45
Automotive Parts/Accessories	2.59

7. Measures

The dependent variable is the volume of in-app sales revenues for the sampled retailers in 2016. The three focal independent variables were measured as follows. *Outbound directedness* was defined as the extent to which the retailer engages in outbound-directed advertising relative to inbound-directed advertising in the context of location-aware tactics. To measure this construct, we counted the number of inbound and outbound LBM tactics. Location-aware outbound tactics included location-aware notifications which were triggered by technologies such as beacons to push information to customers as they were in proximity of aisles relevant to their interest. Location-aware inbound tactics included in-store features, which range from loyalty based mobile coupons customers can voluntarily check for to QR codes to request product information. We then take the ratio of the two counts (location-aware outbound/location-aware inbound). Hence, a lower value on the variable indicates it is directed more in favor of inbound advertising, whereas a higher value indicates it is directed more towards outbound advertising. *Mobility directedness* was defined as the extent to which the retailer engages in advertising directed towards smartphones over tablets. Again, we counted the LBM tactics that were made available on smartphones and those available on tablets. We then take the ratio of the two counts to obtain the measure (advertising directed to smart phones/advertising directed to tablets). Accordingly, a lower value on the variable implies it is directed more towards tablets, and a higher value indicates it is directed more towards smartphones. *Privacy directedness* was defined the extent to which retailers make the LBM tactics more toward privacy-oblivious. Apple users over privacy-seeking Android users. To measure this, we first counted the number of LBM tactics that are available on Android systems and those on iOS systems. We then took a ratio of the two counts (iOS Apple systems / Android systems). In this case, a higher value indicates retailers target more delivery to the privacy-oblivious Apple users, whereas a lower score indicates more delivery to privacy- seeking Android users (see Table 2).

8. Analysis and results

As the purpose of the study is to examine the interaction effects of LBM delivery tactic, interface mobility and user privacy on in-app mobile revenues, three-way interaction is included in our analysis. In order to effective test the interactions, we followed the procedures prescribed in Dawson (2014). As we are also interested in the effect size of the three interactions, we adopted the hierarchical regression analysis by entering the two-way interaction terms in the initial analysis and then add the three interaction term in the final analysis.

All three factors, their two-way as well as three-way interactions were found to be significant. The mobile in-app revenue model accounted for 55.4% of the variance in revenues such that $F(10, 52) = 6.471$, $p < .001$. Main effects are significant, $\beta^{\text{Mobility directedness}} = -4.825$, $t = -3.832$, $p < .001$; $\beta^{\text{Outbound Directedness}} = -5.375$, $t = 4.447$, $p < .001$; $\beta^{\text{Privacy directedness}} = -4.54$, $t = 3.674$, $p < .001$. Similarly, the two way interactions are significant, i.e., $\beta^{\text{Mobility X}}$

Table 2
Constructs and measures.

Construct	Definition	Operationalized Measure
Delivery Tactic	LBM delivery tactic can range from inbound, where location based information is provided upon request, to outbound, where notifications are pushed to customers	*Outbound Directedness*: The extent to which retailers used (outbound) location-aware notifications over (inbound) in-store features
Interface Mobility	Interface mobility is higher for devices which can be used in wider variety of contexts and roles in the shopping process	*Mobility Directedness*: The extent to which retailers available interactive interfaces (applications) are for smartphones over that of tablets
User Privacy	Users can be privacy seeking, i.e. cautious about mobile purchases or privacy oblivious, favoring mobile commerce and transactions	*Privacy Directedness*: The extent to which retailers have apps available for privacy oblivious Apple users over privacy-seeking Android users
LBM	Location based marketing: where marketing content or stimulus are generated based on geographic sensors to provide consumers information relevant to their immediate surroundings	

Table 3
Effects of outbound directedness, brand directedness and device directedness on In-App advertising revenues.

	Sum of Squares	df	Mean Square	F	Sig.
Regression	29.826	10	2.983	6.471	0.000
Residual	23.969	52	0.461		
Total	53.795	62			
Variables		Unstandardized Beta		t	Sig
(Constant)		13.61		6.77	0.000
Outbound Directedness (OD)		−5.375		−4.447	0.000
Mobility Directedness (MD)		−4.825		−3.832	0.000
Privacy Directedness (PD)		−4.541		−3.674	0.001
OD × MD		2.694		3.907	0.000
OD × PD		4.516		5.315	0.000
MD × PD		3.249		4.16	0.000
OD × MD × PD		−2.389		−5.012	0.000

$\beta^{\text{Outbound Directedness}} = 2.695, t = 3.907, p < .001$; $\beta^{\text{Outbound x Privacy directedness}} = 4.516, t = 5.315, p < .001$; $\beta^{\text{Privacy x Mobility directedness}} = 3.249, t = 4.16, p < .001$. The three way interaction is also significant $\beta^{\text{Privacy x Mobility x Outbound Directedness}} = -2.389, t = -5.012, p < .001$ (see Table 3).

9. Interpretation of the results

In models including higher order interaction terms, the most critical question becomes the validity of the lower order coefficients. While some perspectives suggest they are automatically rendered meaningless, it is possible that in some cases, the lower order interaction terms are independent of their higher order versions. In order to test for that, it is important to visualize the betas in a graphical interface (see Fig. 1).

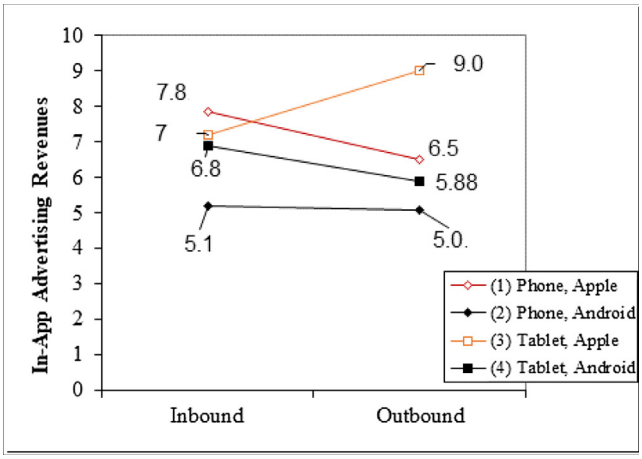

Fig. 1. Effects of LBA delivery, privacy and interface on In-App advertising revenues.

A close examination of the above figure validates the value of our study in the sense that multiple interaction effects are present. No general conclusion can be drawn regarding the independent effects of privacy, interface, or delivery without taking into consideration the role of others. Regarding the effect of inbound-outbound marketing message, the effects depend on both user privacy and interface mobility. While outbound message generated higher mobile sales when targeted Apple tablets, targeting Apple phone users and Android tablet users actually resulted in lower mobile sales compared with inbound tactics. Regarding the effect of interfaces, no conclusion can be drawn unless we take into consideration user privacy and delivery. Apple phone generated the highest mobile sales when inbound marketing messages were used while Apple tablet generated the highest mobile revenue when outbound marketing messages were used. And both Android devices (phone and tablet) perform poorly compared with Apple devices (phone and tablet) regardless of the type of message delivery. Similarly, the interpretation of the effects of user privacy requires the consideration of interface types and message delivery. For Apple users, Tablets generate the highest mobile revenue when coupled with outbound messages while phones generate the highest revenue when coupled with inbound messages. As for Android systems, phones seem to be independent of nature of the message while tablet are susceptible of the nature of message. We observe that mobile revenues decline as retailers shift more outbound messages to Android tablets.

Looking at the two-way interactions, we observe that: The Outbound × Mobility positive results are inconclusive, as the results for Android customers are the opposite that of Apple customers. The Outbound × Privacy results are meaningful, because irrespective of device, Apple customers generate higher revenues than Android with outbound campaigns. The Mobility × Privacy results are also inconclusive, as outbound campaigns reverse the pattern of Apple phone customers generating more revenues than tablet users. The three-way interaction demonstrates a difference between Apple and Android users. For Apple, whether phone generates more revenue or tablet depends on the type of campaign. But for Android, the tablet always generates more revenues irrespective of type of campaign.

To test for the statistical significance of our observed differences and effects, we conduct post-hoc tests for pairwise slope differences, which essentially compare effectiveness of outbound location based advertising campaigns compared to inbound for different types of users. Apple Phone and Android tablet show no significant differences, and thus demonstrate equal ineffectiveness or decline. Android phone users do not demonstrate any decline, or increase, and Apple tablet users demonstrate a significant revenue increase to outbound campaigns (see Table 4).

After running the model with and without the three-way interaction, the difference appears to be almost 19% R-Square, which translates into a high effect size of 28.9%, indicating the value of taking into consideration all three factors in determining LBM delivery effectiveness (see Table 5).

Table 4
Post Hoc tests of pairwise slope comparisons.

Pair of slopes	t-value for slope difference	p-value for slope difference
(1) and (2)	−2.389188	0.019
(1) and (3)	−4.301011	0.000
(1) and (4)	−0.585754	0.560
(2) and (3)	−2.955196	0.004
(2) and (4)	1.6183458	0.109
(3) and (4)	5.049221	0.000

Table 5
Effect size of three-way interaction.

Model type	R	R Square	Adjusted R Square	Std. Error of the Estimate
With Interaction	0.745	0.554	0.469	0.67892
Without interaction	0.61	0.372	0.279	0.79088
Effect Size		**0.28981**		

10. Managerial implications

The findings reveal an interplay among message delivery tactic, the advertising interface, and the consumer preferences. Our study indicates that firms need to look beyond the one-fit for all strategy in order to achieve the optimal sales from their LBM efforts. LBM strategies need to be differentiated based on the privacy needs and interface mobility of devices they are deployed on. It is interesting to note that had we ignored the brands and device types in our analysis, inbound and outbound marketing delivery tactics would have appeared equally effective in generating sales. However, by taking into consideration user privacy and interface mobility, our study offers a much more intricate understanding of how LBM marketing efforts can impact revenues. In general, LBM efforts directed towards Apple users are more effective in generating revenues than those towards Android users regardless of the device types. While inbound marketing effects are more complex, the outbound marketing tactics seem to work better through tablets than phones regardless of the users' privacy needs. When targeting Android users, it is advisable to adopt more inbound marketing messages than outbound messages to optimize sales. This is particularly true when the message is sent over tablets. For Apple users, there is a clear interaction effect between the types of devices (phone vs. tablet) and delivery tactic (inbound vs. outbound). For Apple phones, it is advisable to adopt more inbound marketing messages while for tablets outbound messages are more desirable. The three-way interaction offers a plausible explanation of the conflicting findings in the literature by examining the impact of LMB ads taking into consideration all factors.

There are three major implications which emerge from the above findings. Marketing operations managers need to account for these factors when considering allocation decisions of limited resources such as promotional budgets to track their performance. *First,* the private nature of Android users become evident in their responses to both types of location based campaigns. Irrespective of type of campaign and type of device used, targeting introverted Android users generates much lower revenue than Apple users. It also raises the potential need for developing settings, apps and features catering to the need of more private customers. *Second*, the effect of targeting more (phone) or less (tablet) mobile interfaces varies across user privacy needs. For Apple users, tablets respond much better to outbound campaigns than phone users, and while targeting the latter with outbound lowers revenues, targeting the former with outbound campaigns raises revenues. Among Android users, phones always generate less revenue than tablets. However, with outbound campaigns Android tablet users' revenues are lowered substantially, whereas that of phone users is reduced marginally. *Third*, as interface mobility increases, effectiveness of outbound delivery does not improve, irrespective of user privacy needs.

Though operationalized in the current study using device type and brand, interface mobility and user privacy are perceptual and behavioral constructs which may undergo transformation through broader positioning efforts or media-driven trends. Thus, these constructs should be continuously monitored. Whether it be for the purpose of allocating existing promotional budgets or designing and developing new features and settings on different types of delivery channels and audiences, marketers need to remember that their promotional efforts will be construed in divergent ways depending on the privacy needs of customers and the extent of personalization or sharing of the device. An advantage of targeting these users and channels is the targeting can be extremely specific, as all targeting of Android tablet users can be done by focusing on devices that have Android tablet apps installed as gateways for marketing activities. In other words, instead of targeting people and their behavior based on demographics and other variables, one can simply target the type of app installed. By utilizing application interface design to predict user preference schema, these apps can generate greater promotional effectiveness.

11. Limitations

A double-edged sword for this research paper has been the rich and unique proprietary dataset purchased from multiple third party sources. While the findings provide interesting insights into a growing industry, the authors were not able to elaborate methods of data collection to account for measurement errors because the data was collected by neutral third party experts. In addition, while mobile sales revenue as a dependent variable is an advantage over previous studies, we acknowledge that the analysis is conducted at firm level. What specific tools among the inbound and outbound strategies actually drives the mobile sales remains unanswered. As this growing industry matures with more conversations about effectiveness of marketing practices, we look forward to the emergence of verifiable benchmark data, more fully delineated data collection techniques, and future research studies that reflect on the external validity measures.

References

ABI Research (2016). BLE Beacon Market Remains on Target to Break 400 Million Shipments in 2021. Retrieved from: https://www.abiresearch.com/press/ble-beacon-market-remains-target-break-400-million/.

Alnawas, I., & Aburub, F. (2016). The effect of benefits generated from interacting with branded mobile apps on consumer satisfaction and purchase intentions. *Journal of Retailing and Consumer Services, 31*, 313–322.

Arthur, C. (2011). Tablet use up during mornings and evenings. Retrieved from: https://www.theguardian.com/technology/2011/nov/18/tablet-smartphone-use-breakfast-evening.

Banerjee, S., & Dholakia, R. R. (2008). Does location based advertising work? *International Journal of Mobile Marketing, 3*(2), 68–75.

Banerjee, S., & Dholakia, R. R. (2013). Situated or ubiquitous? A segmentation of mobile-shoppers. *International Journal of Mobile Communications, 11*, 530–557.

Barron, R. (2017). Cyber Monday overtakes Black Friday as top shopping day. Retrieved from: http://www.greensboro.com/business/local_business/cyber-monday-overtakes-black-friday-as-top-shopping-day/article_8a47c851-53c8-5a68-879e-313b3d7b22d6.html.

Bart, Y., Stephen, A. T., & Sarvary, M. (2014). Which products are best suited to mobile advertising? A field study of mobile display advertising effects on consumer attitudes and intentions. *Journal of Marketing Research, 51*(3), 270–285.

Bartikowski, B., Gierl, H., & Richard, M. O. (2018). Effects of 'feeling right' about website cultural congruency on regular and mobile websites. *Journal of Business Research*. https://doi.org/10.1016/j.jbusres.2018.11.036.

Beck, A. (2017). Introducing the IAB Mobile Location Playbook for Retail Marketers. Retrieved from: https://www.iab.com/news/introducing-iab-mobile-location-playbook-retail-marketers/.

Bhatnagar, A., & Papatla, P. (2019). Di habits influence the type of information that smartphone shoppers seek? *Journal of Business Research, 94*, 89–98.

Bleoju, G., Capatina, A., Rancati, E., & Lesca, N. (2016). Exploring organizational propensity toward inbound–outbound marketing techniques adoption: The case of pure players and click and mortar companies. *Journal of Business Research, 69*(11), 5524–5528.

Chae, M., & Kim, J. (2004). Do size and structure matter to mobile users? An empirical study of the effects of screen size, information structure, and task complexity on user activities with standard web phones. *Behavior and Information Technology, 23*,

165–181.
Clarke, I. (2001). Emerging value propositions for M-commerce. *Journal of Business Strategies, 18*(2), 133–148.
Criteo (2016). State of mobile commerce. Retrieved from: http://www.criteo.com/media/3750/criteo-state-of-mobile-commerce-report-q4-2015.pdf.
Dawson, J. (2014). Moderation in management research: What, why, when, and how. *Journal of business Psychology, 29*, 1–19.
De Haan, E., Kannan, P. K., Verhoef, P. C., & Wiesel, T. (2018). Device switching in online purchasing: Examining the strategic contingencies. *Journal of Marketing, 82*(5), 1–19.
Etter, S. (2013, May 31). Smartphones vs. Tablets: Forrester Reveals the Differences. Retrieved from http://www.business2community.com/mobile-apps/smartphones-vs-tablets-forrester-reveals-the-differences-0510069#DAa1HRLcwE7Mp7zz.97.
Gao, T., Rohm, A., Sultan, F., & Pagani, M. (2013). Consumers un-tethered: A three-market empirical study of consumers mobile marketing acceptance. *Journal of Business Research, 66*, 2536–2544.
Gardner, D. (2012). Adobe digital marketing study finds tablets rule for shopping. Retrieved from: http://www.cmo.com/features/articles/2012/1/18/adobe-digital-marketing-study-finds-tablets-rule-for-shopping.html#gs.Ihs7n74.
Geddes, J. (2015, Nov. 26). Amazon, Target and other retailers pushing apps with mobile only black Friday deals. Retrieved from http://www.techtimes.com/articles/110307/20151126/amazon-target-and-other-retailers-pushing-apps-with-mobile-only-black-friday-deals.htm.
Gilbert, J. (2011, Oct. 03). How Americans value their phones compared to sex, chocolate, and shoes. Retrieved from http://www.huffingtonpost.com/2011/08/03/how-americans-value-their-smartphones_n_917622.html.
Grewal, D., Bart, Y., Spann, M., & Zubcsek, P. (2016). Mobile Advertising: A framework and research agenda. *Journal of Interactive Marketing, 34*(1), 3–14.
Groβ, M. (2015). Mobile shopping: A classification framework and literature review. *International Journal of Retail and Distribution Management, 43*(3), 221–241.
Gupta, S. (2013). For mobile devices, think apps, not ads. *Harvard Business Review, 91*(3), 70–75.
Hong, W., Thong, J., & Tam, K. (2014). The effects of information format and shopper task on consumers' online shopping behavior: A cognitive fit perspective. *Journal of Management Information Systems, 21*(3), 149–184.
Huang, L., Lu, X., & Ba, S. (2016). An empirical study of the cross-channel effects between web and mobile shopping channels. *Information and Management, 53*, 265–278.
Interaction Design Foundation (2016). What you need to know about Smartphone vs Tablet use of the mobile internet. Retrieved from https://www.interaction-design.org/literature/article/what-you-need-to-know-about-smartphones-vs-tablet-use-of-the-mobile-internet.
Jang, S., Kitchen, P., & Kim, J. (2018). The effects of gamified customer benefits and characteristics on behavioral engagement and purchase: Evidence from mobile exercise application uses. *Journal of Business Research. 92*, 250–259.
Jih, W., & Lee, S. (2004). An exploratory analysis of relationships between cellular phone uses' shopping motivators and lifestyle indicators. *Journal of Computer Information Systems, 44*, 65–73.
Ketelaar, P. E., Bernritter, S. F., Woudenberg, T. J., Rozendaal, E., Konig, R., Huhn, A. E., ... Jassen, L. (2018). "Opening" location-based Mobile Ads: How Openness and Location Congruency of Location-based Ads Weaken Negative Effects of Intrusiveness on Brand Choice. *Journal of Business Research, 91*, 277–285.
Li, C., Luo, X., Zhang, C., & Wang, X. (2017). Sunny, rainy, and cloudy with a chance of mobile promotion effectiveness. *Marketing Science, 36*(5), 762–779.
Low, E. (2017, March 10). Seeking e-commerce shoots among retail's brick-and-mortar decline. Retrieved from http://www.investors.com/research/industry-snapshot/retail-snapshot/.
McLean, G., Osei-Frimpong, K., Al-Nabhani, K., & Marriott, H. (2020). Examining consumer attitudes towards retailers' m-commerce mobile applications–An initial adoption vs. continuous use perspective. *Journal of Business Research, 106*, 139–157.
Molitor, D., Reichart, P., and Spann, M. (2016). Location-based Advertising and Contextual Mobile Targeting. ICIS 2016 conference proceedings.
Mpinganjira, M., & Maduku, D. (2019). Ethics of mobile behavioral advertising: Antecedents and outcomes of perceived ethical value of advertised brands. *Journal of Business Research, 95*(August), 464–478.
Mukherjee, A., & Nath, P. (2007). Role of electronic trust in online retailing: A re-examination of the commitment-trust theory. *European Journal of Marketing, 41*(9/10), 1173–1202.
O'Malley, L., Patterson, M., & Evans, M. (1997). Intimacy or intrusion? The privacy dilemma for relationship marketing in consumer markets. *Journal of Marketing Management, 13*, 541–559.
Opreana, A., & Vinerean, S. (2015). A new development in online marketing: Introducing digital inbound marketing. *Expert Journal of Marketing, 3*(1).
Ozok, A. A., & Wei, J. (2010). An empirical comparison of consumer usability preferences in online shopping using stationary and mobile devices: Results from college student population. *Journal of Electronic Commerce Research, 10*, 111–137.
Palos-Sanchez, P., Saura, J. R., & Martin-Velicia, F. (2019). A study of the effects of programmatic advertising on user's concerns about privacy overtime. *Journal of Business Research, 96*, 61–72.
Persaud, A., & Azhar, I. (2012). Innovative mobile marketing via smartphones. *Marketing Intelligence and Planning, 30*(4), 418–443.
Reeves, B., Lang, A., Kim, E. Y., & Tatar, D. (2009). The effects of screen size and message content on attention and arousal. *Journal of Media Psychology, 1*(1), 49–67.
Shankar, V., Venkatesh, A., Hofacker, C., & Naik, P. (2010). Mobile marketing in the retailing environment: Current insights and future research avenues. *Journal of Interactive Marketing, 24*(2), 111–120.
Scribner, H. (2016, November 30). Android and iPhone users do have personality differences, according to study, Retrieved from http://www.deseretnews.com/article/865668316/Android-and-iPhone-users-do-have-personality-differences-according-to-study.html.
Sinicki, A. (2016). State of IAPs: iOS users spend 2.5x more on in-app purchases than Android users. Retrieved from https://www.androidauthority.com/new-report-reveals-that-ios-users-spend-2-5-more-on-in-app-purchases-than-android-users-700983.
Smith, C. (2011a, August 16). iPhone users vs. Android users: who's richer, more polite? Retrieved from http://www.huffingtonpost.com/2011/08/16/iphone-vs-android-users_n_928275.html.
Smith, C. (2011b, August 6). iPhone vs. Android: which does your state prefer? (study). Retrieved from http://www.huffingtonpost.com/2011/08/05/iphone-android-state_n_919488.html.
Ström, R., Vendel, M., & Bredican, J. (2014). Mobile marketing: A literature review on its value for consumers and retailers. *Journal of Retailing and Consumer Services, 21*, 1001–1012.
Thompson, D. (2017). What in the World is Causing the Retail Meltdown of 2017? *The Atlantic* April 10.
Tsang, M., Ho, S., & Liang, T. (2004). Consumer attitudes toward mobile advertising: An empirical study. *International Journal of Electronic commerce. 8*(3), 65–78.
Vernuccio, M., & Ceccotti, F. (2015). Strategic and organisational challenges in the integrated marketing communication paradigm shift: A holistic vision. *European Management Journal, 33*(6), 438–449.
Wagner, G., Schramm-Klein, H., & Steimann, S. (2020). Online Retailing across e-channel touchpoints: Empirical studies of consumer behavior in the multichannel e-commerce environment. *Journal of Business Research, 107*, 256–270.
Watson, C., McCarthy, J., & Rowley, J. (2013). Consumer attitudes towards mobile marketing in the smart phone era. *International Journal of Information Management, 33*, 840–849.
xAd (2015). Nearly 80% of Marketers Around the World Use Location Targeting for Mobile Ad Campaigns. Retrieved from: https://www.groundtruth.com/press-releases/nearly-80-of-marketers-around-the-world-use-location-targeting-for-mobile-ad-campaigns/.
Xie, W., Zhao, Y., & Xie, W. (2013). The effects of interface design of hand-held devices on mobile advertising effectiveness among college students in China. *International Journal of Mobile Marketing, 8*(1).
Yang, B., Kim, Y., & Yoo, C. (2013). The integrated mobile advertising model: The effects of technology- and emotion-based evaluations. *Journal of Business Research, 66*, 1345–1352.
Young, H. (2014). 2014 Mobile Behavior Report Reveals Key Findings on Usage, Apps, Downloads and More. Retrieved from: https://www.salesforce.com/blog/2014/02/mobile-behavior-report.html.