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# Contemporaneous and Delayed Sales Impact of Location-Based Mobile Promotions

Zheng Fang
Department of Marketing and Electronic Commerce, School of Business, Sichuan University, 610064 Chengdu, Sichuan, China, 149281891@qq.com

Bin Gu
Department of Information Systems, W. P. Carey School of Business, Arizona State University, Tempe, Arizona 85287, bin.gu@asu.edu

Xueming Luo
Department of Marketing, Fox School of Business, Temple University, Philadelphia, Pennsylvania 19122, luoxm@temple.edu

Yunjie Xu
Department of Information Management and Information Systems, School of Management, Fudan University, 200433 Shanghai, China, yunjiexu@fudan.edu.cn

Can location-based mobile promotion (LMP) trigger contemporaneous and delayed sales purchases? As mobile technologies can reach users anywhere and anytime, LMP becomes a promising new channel. We unravel the dynamic sales impact of LMP on the basis of a randomized field experiment with 22,000 mobile users sponsored by one of the largest mobile service providers in the world. Our identification strategy is to gauge the marginal increases in consumer purchases of the geo-fenced treatment group of users who received LMP, above and beyond the baseline control groups. There are two controls: one group who received the same LMP but not in the virtual geo-fencing locational range (nongeo-fenced control), and the other who did not receive the LMP but in the geo-fencing range (geo-fenced control). The latter control serves as an organic holdout baseline from the similar population, i.e., counterfactual test of what if without the mobile LMP intervention, to identify the actual "lift" of incremental purchases caused by the treatment with the mobile LMP intervention. Findings suggest that LMP treatment has a significantly stronger impact on contemporaneous (same-day) purchases and delayed (subsequent-days) purchases than the controls. The randomized experiment design renders these findings robust to alternative explanations such as mobile usage behavior heterogeneity, product effects heterogeneity, nonrandomized sample-selection bias, and endogeneity concerns. Follow-up surveys with the field experiment users explore the nuanced mechanisms via which LMP may induce the impulsive, same-day purchases, and create product awareness for the planned subsequent-days purchases. LMP can generate six times more purchases than nongeo-fenced control with the LMP intervention, and 12 times more than geo-fenced control without the LMP intervention. LMP has a delayed sales effect for 12 days after the mobile promotions. The total sales impact of LMP could be underestimated by 54% if excluding the delayed sales impact and only including the contemporaneous impact. These findings are new to the literature and often neglected in mobile promotion practices, proffering novel implications on the sales value of LMP in the mobile era.

*Keywords*: mobile computing; mobile promotion; location-based mobile promotion; advertising; dynamic impact; randomized field experiment
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## 1. Introduction

Recent developments in mobile communication technologies present businesses a new marketing channel of mobile promotion. Mobile promotion proffers personalized communication opportunities for businesses to connect with targeted consumers (Andrews et al. 2015, Ghose et al. 2012, Scharl et al. 2005). Although mobile promotion takes many forms, e.g., banner ads on mobile websites (Goh et al. 2009), the vast majority are delivered through short message service (SMS) due to cost considerations and cross-device compatibility (Mirbagheri and Hejazinia 2010).[1] Over 84% of the U.S. population owns mobile devices. The

[1] There are successful SMS campaigns even by non-profit organizations such as the American Red Cross. Following the deadly 2010 earthquake, its SMS donations helped garner $32 million in relief from over three million people. Ninety-five percent of them were first-time donors.

growth of mobile services has been remarkable in Africa, Asia, and Europe as well (Luo et al. 2014).

Mobile promotion has two unique technological features over traditional tools. First, mobile technology is location sensitive. It not only allows businesses to expand their reach to consumers but also enables them to obtain information on consumers' whereabouts. With this information, businesses can deliver personalized marketing messages tailored to a consumer's location and surrounding environment. Second, mobile technologies increase consumer accessibility. A mobile user can be reached anytime, anywhere. Given this ubiquitous accessibility, mobile devices have become one of the most employed personal devices in consumers' daily lives, and consumers pay more attention to messages delivered through mobile devices than traditional channels such as billboard, TV, and print (Ghose and Han 2014). Not surprisingly, businesses embrace mobile platforms as a novel marketing tool (Fong et al. 2015, Friedrich et al. 2009). Thus, mobile promotion represents a tool to implement *real-time marketing*, a term coined by Oliver et al. (1988) that entails meeting "customer needs at the time and place they want it" (Brunner and Kumar 2007, p. 4).

Against this background, we herein focus on a specific type of mobile promotion: location-based mobile promotion (LMP) and assess its dynamic impact on sales with consumer purchases data. LMP refers to promotions customized for recipients' geographic positions and delivered automatically to mobile devices when a consumer is within the vicinity of the promoting business, i.e., geo-fencing. Though promising, LMP's sales impact has been largely neglected in the extant literature. The relatively few studies have focused on either immediate sales or consumer purchase intention with lab data (Butcher 2011, Molitor et al. 2012, Ververidis and Polyzos 2002). In doing so, these studies implicitly assume that real-time marketing equates to impulsive, spontaneous purchases. However, LMP may also trigger need recognition and initiate planned purchase processes that could take time to materialize, i.e., with nonimpulsive, delayed sales impact on consumer purchases. This is because consumers may store LMP on their mobile devices and retrieve it for later evaluation and planned purchases. To our knowledge, no prior research addresses whether and to what degree LMP triggers both contemporaneous impulsive purchases and future planned purchases in field settings.

Therefore, the goal of our work is to divulge the dynamic impact of LMP on the basis of a randomized field experiment sponsored by one of the largest mobile service providers in the world. Our identification strategy is to track the marginal increases in consumer purchases of the geo-fenced treatment group of users who received LMP, above and beyond the baseline control groups. There are two controls: one group who received the same LMP but not in the virtual geo-fencing locational range (nongeo-fenced control), and the other who did not receive the LMP but in the geo-fencing range (geo-fenced control). The latter control serves as an organic holdout baseline from the similar population, i.e., counterfactual test of what if without the mobile LMP intervention, to identify the actual "lift" of incremental purchases caused by the treatment with the mobile LMP intervention.

On the basis of 22,000 mobile users, we find that compared with the controls, the treatment group of LMP has a statistically significant impact on both contemporaneous (same-day) and delayed (subsequent-days) sales purchases. The randomized experiment design renders these findings robust to alternative explanations such as mobile usage behavior heterogeneity, product effects heterogeneity, nonrandomized sample-selection bias, and endogeneity concerns with high internal validity. To further explore the underlying factors that drive the dynamic impact of LMP, we conduct a follow-up survey of a randomized sample of mobile users who received LMP during the study period. The survey results suggest that since LMP may deliver relevant messages at the right time and right place, perceived location and time congruence can account for the impulsive, contemporaneous purchases of LMP. Also, as LMP could create need recognition for future consumption decision making and LMP is stored on mobile devices with easy retrieval, planned behavior stages can account for the nonimpulsive, delayed purchases of LMP. To boost the generalizability and external validity, we complemented the randomized field experiment data with daily archival data of historical LMP campaigns with over three million mobile users. The analyses confirm the dynamic impact of LMP as identified in the randomized field experiment. These findings provide consistent support that LMP not only attracts spontaneous and impulsive purchases but also creates product awareness for future purchase considerations.

This study makes several contributions to the literature. First, it addresses an interesting and important subject of considerable practical relevance. Mobile commerce is ostensibly a research area of growing interest, and this topic is important for the adoption of mobile communication technologies among consumers and businesses (Ghose and Han 2014). Despite the great interest in LMP, there is a lack of research on its sales effectiveness in an actual field setting. We advance literature on behavioral attitudes and adoption of mobile promotions (Brunner and Kumar 2007, Provost 2011) by addressing the sales impact of LMP. In the traditional treatment-control sense, randomized field experiments control for unobservable heterogeneity and avoid endogeneity biases (Goldfarb

and Tucker 2011, Luo et al. 2014). Differences in user purchases are then attributed to the treatment effects of LMP vis-à-vis the control condition of no LMP.[2] Beyond the soft attitude-based survey data, we utilize the hard purchase records data from a randomized field experiment and company archival data to triangulate the empirical evidence for the sales effects of LMP. In this sense, we also respond to calls for research testing and justifying company investments in information technology (IT) in general and mobile technologies in particular (Jasperson et al. 2005, Gao and Hitt 2012).

Second, to the best of our knowledge, this is the first attempt in information systems (IS) and marketing disciplines to quantify the contemporaneous and delayed effects of LMP. The extant literature in both marketing and IS proffers little rigorous empirical work on the dynamic effect of mobile promotions on immediate and future sales purchases (Andrews et al. 2015, Ghose and Han 2014, Luo et al. 2014). This is the major research gap we strive to bridge. We not only analyze the contemporaneous effect of LMP but also assess its dynamic impact over time. Combining field experiment, company records, and postexperiment surveys, we reveal insights into the effect scale of LMP, as well as the possible psychological mechanisms for the nuanced sales impact of LMP. Our findings suggest that LMP drives impulsive, contemporaneous sales because it can offer utilities to consumers at the right time and right place. Also, LMP drives nonimpulsive, delayed sales because it may engender need recognition, future consumption decision making, and planned purchase behavior. Thus, the theory of real-time marketing can be reconciled and extended with the theory of planned behavior because location and time proximity have a significant impact on contemporary sales but not on delayed sales, whereas the stages of planned behavior have a significant effect on delayed sales. These insights are novel for the literature on LMP.

Besides these intellectual insights for academia, our paper proffers novel takeaways for managers. Location-based mobile promotions promise a new marketing channel in the long run. Compared with traditional communication technologies, mobile technologies offer unique characteristics, i.e., higher accessibility and location sensitivity. As such, managers should understand that mobile promotion provides high business values to target consumers at the right time and right place. Also, our findings help managers cultivate a better understanding of the total effects of LMP and gauge its cumulative impact over time. This is nontrivial because in practice, managers tend to limit LMP to drawing only spontaneous store visits and contemporaneous purchases (Carr 2012, Finocchiaro 2010). Rather, we find that besides inducing impulsive, same-day purchases, LMP can boost product awareness for the planned subsequent-days purchases. Thus, to assess the total sales performance of LMP, a firm should consider not only the real-time impulsive buying effect but also delayed, nonimpulse buying effect. The delayed sales impact could be even more substantial in scale but is often neglected in mobile promotion practices. Thus, without considering the dynamic impact, managers may underestimate the potency of mobile promotions and, if so, underinvest in mobile technologies and miss the tremendous business values of LMP in the mobile era (Ghose and Han 2014).

The rest of the paper is organized as follows. In §2, we review the mobile promotion and LMP literature and present a theoretical framework on how LMP influences consumers' impulsive buying and planned buying behavior. Section 3 reports the results of the randomized field experiment and the follow-up survey. Section 4 concludes with a discussion of the implications based on our findings.

## 2. Conceptual Background

### 2.1. Characteristics of Mobile Technology and LMP

Mobile technology has a number of unique characteristics compared with traditional information and communication technology. Similar to traditional information technologies, it can store information, run applications, and connect and communicate with other information sources and people. The unique characteristics of mobile technology comprise its location sensitivity and higher accessibility (Nysveen et al. 2005, Ghose et al. 2012). Location sensitivity refers to the ability of the device to identify its geographic location, a unique feature of mobile technology based on a global positioning system (Xu et al. 2011). Accessibility refers to the ease of access to the device and information in real time. Because of its small size, users can carry a mobile device anytime and anywhere (Junglas and Watson 2006). The combination of accessibility and location sensitivity makes LMP an ideal channel for real-time marketing. Real-time promotions can meet consumer needs at the time and place they want it (Oliver et al. 1988). Importantly, real-time marketing recognizes that customer needs change constantly over time and place (McKenna 1999). Mobile technology allows businesses to obtain real-time location-specific information on consumers

[2] We acknowledge one anonymous reviewer who helped us to compile another control condition as an organic holdout baseline, i.e., a counterfactual test of what if no LMP intervention, to identify the actual "lift" of incremental purchases caused by the treatment of LMP (with the mobile LMP intervention).

**Table 1 Extant Literature on Mobile Promotion**

| Reference | Dependent variable | Data | Product and technology | Dynamic impact |
|---|---|---|---|---|
| *This study* | *Actual sales* | *Sales data* | *LMP* | *Yes* |
| Ghose et al. (2012) | *Mobile browsing* | Clickstream data | LMP | No |
| Molitor et al. (2012) | *Coupon clicking and redemption* | Clickstream data | LMP | No |
| Soroa-Koury and Yang (2010) | *Intention* | Survey | Mobile promotion in general | No |
| Xu et al. (2009) | *Intention* | Lab experiment | LMP | No |
| Brunner and Kumar (2007) | *Attitude toward LMP* | Survey | General location ads | No |
| Xu et al. (2009) | *Intention* | Lab experiment | LMP | No |
| Goh et al. (2009) | *Response to mobile display ad* | Clickstream data | Mobile display ads (varying location) | No |

and deliver personalized marketing messages unique to a customer's location and time.

The research on LMP is nascent. Table 1 presents related literature and clarifies how the current study differs from previous studies. First, although a few recent studies have considered the sales effect of LMP (Ghose et al. 2012, Luo et al. 2014), they mostly examine contemporary sales without considering the possibility of delayed effect on sales. Such a focus overlooks the fact that LMP can motivate need recognition that stimulates future purchases. Second, prior studies use lab experiments (Soroa-Koury and Yang 2010, Ghose et al. 2012, Brunner and Kumar 2007, Zhang and Mao 2008) or clickstream data to assess the impact of LMP. Few of them validate the impact with *actual* consumer purchases in field settings.

### 2.2. Impulsive Buying and Contemporaneous Sales Impact of LMP

Impulsive buying refers to consumers' experience of "a sudden and unplanned urge that is immediately gratifying or acting on an impulse without careful deliberation of the negative or long-term consequences" (Mishra and Mishra 2010, p. 1130; Sengupta and Zhou 2007, p. 297). This definition suggests two key elements in the activation of impulsive buying: (1) the trigger of a sudden and unplanned consumption urge, and (2) the psychological state that allows the desire to instantly fulfill the consumption needs to outweigh various inhibiting factors. Given its real-time nature, LMP can deliver highly relevant marketing messages to consumers at the right time and right place, and thus may activate both elements and lead to impulsive buying (Luo 2005). The more relevant an LMP is in terms of physical proximity or location congruence, the more likely it triggers this urge for contemporaneous purchases. Also, it is noted that temporal proximity to a business may also suppress the inhibiting factor and lead to impulsive buying (Hoch and Loewenstein 1991, Ainslie 1975, Mischel 1974, Loewenstein 1988, Luo et al. 2014). As such, given that LMP is delivered to mobile users with close geographical proximity and temporal proximity, it is conceivable that LMP could lead to impulsive purchases contemporaneously.

### 2.3. Planned Buying and Delayed Sales Impact of LMP

Moreover, LMP can also influence consumers' planned buying behavior for future consumption. According to the theory of planned behavior, consumers make a purchase in five stages: problem recognition, information search, evaluation of product options, purchase decision, and postpurchase support (Engel and Kollat 1978, Kotler 2002). LMP could affect these stages for users who did not act on LMP with impulse purchases. This is because LMP can facilitate users' need recognition and stored LMP on their mobile devices can be used for future evaluation and decision making, i.e., nonimpulse and planned purchases. At the problem recognition stage, LMP could arouse a consumer of the need for future consumption and prompt the planned buying behavior process. In the information search stage, LMP allows promotion messages to be stored in a mobile phone, which facilitates users' access to and retrieval of mobile promotion information (Ghose et al. 2012, Molitor et al. 2012). In the evaluation and decision-making stage, LMP enables consumers to easily share information with and solicit opinions from friends and family members, and it allows social activity scheduling and coordination with relevant others (Kotler 2002, Zhang et al. 2011). This discussion suggests that LMP could facilitate consumer decision making in planned buying behavior for future consumption, thereby engendering the delayed sales effects of LMP. Next, we report two studies to assess the dynamic impact of LMP on sales purchases.

## 3. Randomized Field Experiment

We conducted a randomized field experiment to identify the dynamic impact of LMP. The field experiment approach is desirable because by using the randomized samples of mobile users in a controlled manner, it can precisely gauge the causal sales impact of the treatment vis-à-vis control. That is, a randomized field experiment can account for users' unobservable heterogeneity, and differences in user purchase likelihoods are attributed to the treatment effects of

LMP vis-à-vis the control condition of no LMP. As such, our field experiment approach avoids possible endogeneity biases that might confound results (Goldfarb and Tucker 2011). The corporate partner of our field experiment is one of the largest mobile service providers in China. The mobile service provider established a mobile promotion business with major movie theatre chains that routinely delivers LMP movie ads to customers' mobile devices. The customer base of the movie mobile promotion business is over three million users. The service provider sponsored a field experiment on a randomly selected subsample of its users using the existing LMP movie ads platform for the nationwide release of *Transformers* 4 on May 27, 2014 in China. Given the resources provided by the service providers, we conduct the randomized field experiment by identifying a geo-fenced LMP *treatment* group of 10,000 randomly selected mobile users within 500 meters of a selected theatre.

We also have a *nongeo-fenced control group* of 10,000 randomly selected mobile users more than 500 meters away but in the same city. This control serves as a baseline for nontargeted mobile promotions. Both groups receive the same SMS ad on the same day at the same time. The nongeo-fenced control group is determined based on whether a user was located within a 500-meter vicinity (i.e., geo-fence) from the theatre when they received SMS promotional ads. An implicit assumption is that users' travel patterns are random, or randomized by the geo-fencing natural selection. This assumption could be problematic if users' travel patterns, e.g., whether they visit the movie theatre area frequently, are not random or correlated with their purchase decisions (Ghose et al. 2014). In other words, the nongeo-fenced control group does not address an important, potential endogeneity concern of self-selection bias, which could confound the treatment effects of LMP.

To account for this bias and further strengthen our identification of the causal effects, we compiled a *geo-fenced control group* of 2,000 randomly selected mobile users within 500 meters of the theatre. Both the treatment and geo-fenced control groups are sampled at the same time at the same location and their assignment to the treatment or control group is randomized. This ensures that they are from an identical population free of self-selection bias. We pushed SMS ads to the treatment group and tracked their movie purchases. For the geo-fenced control group, we tracked their mobile location data to infer their movie purchases without the intervention of pushing ad SMS. In particular, using data from the mobile provider's cell-tower records, we tracked whether people's mobile signals in this group have ever stayed at the theatre area for more than 90 minutes during the experiment period (12 days) and use it as a proxy for movie purchase. This geo-fenced control group without the mobile LMP intervention provides an important identification strategy as an organic holdout baseline, i.e., a counterfactual test of what if there is no intervention, to identify the actual lift of incremental purchases caused by the treatment of LMP.

The SMS ad provides a discount on any showing of *Transformers* 4 at the selected movie theatre. The SMS ad reads "To reserve your seat and buy a Transformers 4 movie ticket with your mobile account at a discounted price, follow this link." Recipients purchased movie tickets by clicking through the link in the SMS ad. After a user purchased the ticket, the cost was immediately charged to their mobile account. This allows us to obtain the individual level purchase record in real time after distributing the SMS ad. The discount is valid from the experiment date until the end of the showing of *Transformers* 4 at the selected movie theatre.

We conducted the experiment from 11:00 to 13:00 on June 5, 2014, which is a Saturday and one week after the release of the movie. We did so for three reasons. First, distribution of SMS ads at noon time is known to generate higher response rates, which enhance statistic power, as noon is a peak time when consumers go to shopping malls, where the experiment movie theatre is located. Also, most movie showings are scheduled after noon, which provides a sufficient number of choices to users and allows them ample time to make purchase decisions. Second, one week after the movie's release helps rule out possible alternative explanations. Because *Transformers* 4 is a blockbuster, the theatre is crowded during the first week of its release. This will lead to delayed purchase, which might become a confounding factor of LMP's delay purchase. Third, we choose Saturday versus a weekday to more parsimoniously detect the delayed effects of LMP. Saturday would engender more contemporaneous purchases but fewer delayed purchases compared with weekdays because people have more disposable time for movie watching on Saturday vis-à-vis weekdays.

To identify the dynamic effect of LMP, we also controlled for five factors, and thus our results are robust to these factors. First, we selected a specific movie to promote to rule out alternative explanations of *product heterogeneity*. Second, we restricted our samples to mobile users who had never purchased movie tickets through similar SMS ads, which we are able to ascertain because the company maintains historical purchase records. This is to control for users' *prior experience*, which could influence their purchase decisions. Third, the mobile users in our database were sent SMS messages based on a *randomization* procedure. Following Deng and Graz (2002) we assigned

a random number to each user via SAS software's random number generator with the RANUNI function. Then, we sorted all random numbers in sequence from which to extract a sample. These steps were integrated in the wireless provider's IT system, which enabled instant computation to avoid mobile users moving from one location to another while sending SMSs. This randomization thus controls for *nonrandomized sample-selection bias*. Fourth, in the current experimental setup, there is a restriction on the treatment group that those who received LMP should not receive any other types of targeted ads from the company afterward. Thus, the identified dynamic impact of LMP is not contaminated by or confounded with other targeted ads.[3] Fifth, we controlled for users' *mobile behavior heterogeneity* based on individual users' monthly phone bills, minutes used, SMSs sent and received, and data usage for possible additional selection bias between the treatment and control group. Because by regulations the mobile service provider cannot release customers' private information, we could not identify users by demographic information. However, regulation allows the service provider to release individual level user mobile usage information, including ARPU, MOU, SMS, and GPRS as key indicators of users' mobile usage behavior. ARPU (the average revenue per user) is a measure of the revenue generated by a customer's mobile device. MOU (minutes of usage) constitutes the amount of voice time a user spent on their mobile device. SMS is the number of text messages sent and received by a single user. GPRS (general packet radio service) is used to measure the volume of data usage with the mobile service provider. Table 2 shows the comparison of mobile activities between the treatment group and the control group. The comparison indicates few differences in terms of mobile activities between the treatment and the control groups (all $T$ tests $p > 0.2$), suggesting that selection bias of the treatment group is unlikely to be a concern. To further control for the potential selection bias, we include individual mobile activities as control variables in the analysis.

### 3.1. Empirical Results

The sales purchase results of the treatment and the control groups are reported in Table 3. We denote contemporaneous purchases as the same day sales at T0, and delayed purchases as subsequent-days sales at T1, T2, ..., T11 (the final nonzero sales ended on the 11th day after the LMP). Of the 10,000 users in the treatment group, 193 purchased movie tickets through the SMS link. This response rate of 1.93% is consistent with the industry average rate (Ghose et al. 2012). Also, as shown in Table 3, panel A, the purchases lasted for 12 days from the date of the experiment, and the contemporaneous effect accounts for only 46% of the total effects for LMP, and the delayed effect accounts for 54% of the total effects for LMP. Of the 10,000 users in the nongeo-fenced control group, 36 purchased movie tickets through the link (equating to a 0.36% response rate). Among these sales, purchase behavior lasted for three days from the date of the experiment.[4] Furthermore, of the 2,000 users in the geo-fenced control group, three purchased movie tickets (equating to a 0.15% response rate). Among these sales, purchase behavior lasted for six days from the date of the experiment. The Panel B plot visually presents that LMP treatment indeed is more likely to have not only higher contemporaneous purchases than the two control groups but also more delayed slower nonimpulsive purchases (keep trickling in) over the next 11 days than the two controls. From Table 3, panel A, the results suggest that LMP can generate six times more total sales than nongeo-fenced control, and 12 times more than geo-fenced control without the LMP intervention.

To test the statistical significance between LMP vis-à-vis control groups, we then conducted the logistic regression and presented the results in Table 4. Models 1 and 3 include only the main effect and Models 2 and 4 include control variables of individual mobile activities. The results in Table 4, panel A, suggest that the LMP treatment has a positive and significant impact on the likelihood of *total sales*, compared with the two control groups (both the nongeo-fenced control in Models 1 and 2 and geo-fenced control in Models 3 and 4). These significant findings are robust to the mobile usage behavioral covariates, thus helping rule out alternative explanations due to different mobile usage behavior such as more or less phone bill (ARPU), mobile talking minutes (MOU), mobile SMS intensity (SMS), and mobile data usage (GPRS) in our results.

In addition, results in Table 4, panel B, Models 5 to 8 suggest that the LMP treatment has a consistent positive and significant impact on the likelihood of consumer purchases in terms of *contemporaneous*

[3] We also noted that subjects in both the treatment group and the control group might be exposed to banner ads and other forms of nontargeted marketing effort later but the effect of such promotions shall be statistically the same on the treatment and the control groups. As such, they shall not bias our results.

[4] The short-memory phenomenon in this control group can be explained by considering the relationship between context cue and need recognition. When subjects receive SMS ads far away from the theatre area, there is no context cue associated with the ads. As a result, few subjects experience need recognition, which is critical to the initiation of the planned behavior. The phenomenon can be further assessed using neuro FMRI (functional magnetic resonance imaging) studies to establish the link between mobile ads, context cue, and short-term memory.

**Table 2 Comparison of the Treatment Group with the Control Group**

Panel A. Basic summary statistics of variables

| | Mean | | | Std. dev | | |
|---|---|---|---|---|---|---|
| Variable | LMP treatment | Nongeo-fenced control | Geo-fenced control | LMP treatment | Nongeo-fenced control | Geo-fenced control |
| *ARPU* | 82.6748 | 83.7922 | 81.5571 | 51.1089 | 51.8566 | 50.8292 |
| *MOU* | 712.0853 | 716.0362 | 711.6525 | 606.3850 | 618.0826 | 574.9903 |
| *SMS* | 403.5373 | 403.7748 | 401.9430 | 240.8889 | 249.3136 | 243.6805 |
| *GPRS* | 72,552.7880 | 72,948.8422 | 72,614.4935 | 180,098.6081 | 180,507.3630 | 177,826.2912 |

Panel B. Additional summary statistics

| | Skewness | | | Kurtosis | | |
|---|---|---|---|---|---|---|
| Variable | LMP treatment | Nongeo-fenced control | Geo-fenced control | LMP treatment | Nongeo-fenced control | Geo-fenced control |
| *ARPU* | 2.8112 | 2.8882 | 2.9709 | 15.2385 | 15.4085 | 17.3064 |
| *MOU* | 2.0948 | 2.1780 | 2.0524 | 5.8867 | 6.6796 | 5.4498 |
| *SMS* | 1.7427 | 2.0657 | 2.1538 | 6.9247 | 9.9627 | 10.8371 |
| *GPRS* | 47.6058 | 46.0542 | 49.1735 | 2,712.4340 | 2,586.2604 | 2,507.4635 |

*sales*, compared with the two control groups (both the nongeo-fenced control and geo-fenced control). Again, these results are robust to individual mobile usage behavioral differences.

Similarly, results in Table 4, panel C, Models 9 to 12 suggest that LMP treatment also has a positive and significant impact on the likelihood of consumer purchases in terms of *delayed sales* as well, compared with the two control groups (both the nongeo-fenced control and geo-fenced control). Again, these results are also robust to individual mobile usage behavioral differences.

To further establish the delayed effects of LMP, we develop survival models to test the effects of LMP treatment on purchase hazard daily (complementary to the reported logit results). The results of the Cox proportional hazard analyses confirm that LMP treatment indeed has a significant impact on purchase speed with more delayed and *slower* nonimpulsive purchases over time (hazard ratio = 0.6692, $p < 0.000$ when comparing LMP treatment with the geo-fenced control and 0.8073, $p < 0.000$ when comparing LMP treatment with the nongeo-fenced control). These results are robust with exponential and Weibull

**Table 3 (Color online) Sales Effect of LMP**

| | Contemporaneous (same day purchases) | Delayed (after same-day purchases) | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Panel A | T0 | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 | purchases |
| *LMP treatment* ($n = 10{,}000$) | **89** | **28** | **17** | **10** | **10** | **8** | **11** | **11** | **7** | **1** | **0** | **1** | **193** |
| Nongeo-fenced control ($n = 10{,}000$) | 15 | 18 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36 |
| Geo-fenced control ($n = 2{,}000$) | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |

Panel B

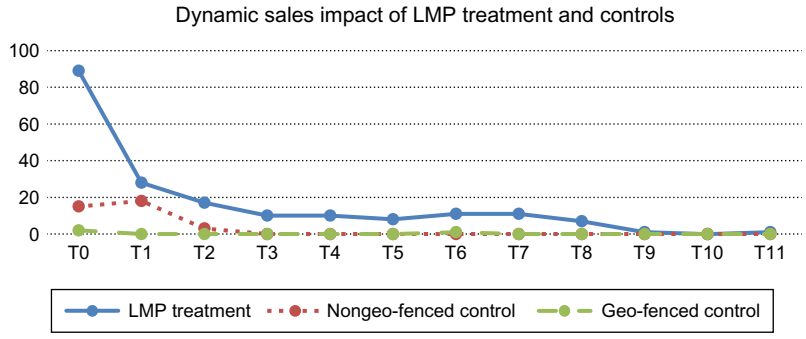

**Table 4 Sales Impact of the Treatment Effect**

| Panel A. Comparison of *total* sales effect | | | | |
|---|---|---|---|---|
| | Model (1) | Model (2) | Model (3) | Model (4) |
| (Intercept) | −5.6232*** (0.1670) | −5.1390*** (0.2466) | −6.5008*** (0.5778) | −5.9940*** (0.6085) |
| *LMP treatment*[a] | **1.6951*** (0.1821)** | **1.6930*** (0.1821)** | **2.5726*** (0.5823)** | **2.5890*** (0.5824)** |
| ARPU | | −0.0014 (0.0017) | | −0.0021 (0.0019) |
| MOU | | −0.0000 (0.0001) | | −0.0000 (0.0001) |
| SMS | | −0.0002 (0.0003) | | −0.0003 (0.0004) |
| GPRS | | 0.0000** (0.0000) | | 0.0000 (0.0000) |
| Panel B. Comparison of *contemporaneous* sales effect | | | | |
| | Model (5) | Model (6) | Model (7) | Model (8) |
| (Intercept) | −6.1622*** (0.2184) | −5.6860 (0.3276) | −6.9063*** (0.7074) | −6.2520*** (0.7605) |
| *LMP treatment*[b] | **1.6158*** (0.2396)** | **1.6150*** (0.2397)** | **2.2040*** (0.7154)** | **2.2170*** (0.7155)** |
| ARPU | | 0.0007 (0.0020) | | −0.0051 (0.0032) |
| MOU | | 0.0000 (0.0002) | | −0.0001 (0.0002) |
| SMS | | −0.0001 (0.0004) | | −0.0002 (0.0005) |
| GPRS | | 0.0000** (0.0000) | | 0.0000 (0.0000) |
| Panel C. Comparison of *delayed* sales effect | | | | |
| | Model (9) | Model (10) | Model (11) | Model (12) |
| (Intercept) | −6.4987*** (0.2584) | −5.9520*** (0.3696) | −7.5990*** (1.0000) | −7.1830*** (1.0330) |
| *LMP treatment*[c] | **1.7965*** (0.2795)** | **1.7920*** (0.2795)** | **3.0530*** (1.0050)** | **3.0730*** (1.0050)** |
| ARPU | | −0.0047 (0.0029) | | −0.0003 (0.0023) |
| MOU | | 0.0000 (0.0002) | | 0.0001 (0.0002) |
| SMS | | −0.0001 (0.0005) | | −0.0003 (0.0005) |
| GPRS | | 0.0000 (0.0000) | | 0.0000 (0.0000) |

*Notes.* Panel A: Dependent variable here is purchase (contemporaneous and delayed) or not. Panel B: Dependent variable here is contemporaneous purchase or not. Panel C: Dependent variable here is delayed purchase or not.

[a]Models 1 and 3 use nongeo-fenced control, and Models 2 and 4 use geo-fenced control.

[b]Models 5 and 7 use nongeo-fenced control, and Models 6 and 8 use geo-fenced control.

[c]Models 9 and 11 use nongeo-fenced control, and Models 10 and 12 use geo-fenced control.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

distributions. As such, hazard analyses add more empirical evidence for our conclusion that LMP has dynamic delayed sales impact, an interesting and important finding for mobile commerce practices and research.[5]

### 3.2. Postexperiment Surveys and Results

To explore mechanisms for our findings of the dynamic impact of LMP, we designed a follow-up telephone survey with the field experiment subjects using the call center of the mobile service provider. The purpose of the field survey is to identify key factors that may account for the same-day impulse purchases and subsequent-days delayed planned purchases. Our field survey requests the field experiment subjects in the treatment group to recall the context under which they received the SMS ads on June 5, 2014 to elicit context-specific responses. Respondents were first asked to confirm whether they had received and read the promotional SMS while near the theatre.[6] Survey questions are developed by drawing on the theories of impulsive purchase and planned purchase behavior. As discussed earlier, the literature suggests ex ante that impulse buying triggers such as time and location congruence account for contemporaneous sales (Ainslie 1975, Hoch and Loewenstein 1991, Loewenstein 1988, Mischel 1974). For delayed sales effect, we draw on the theory of planned purchase behavior (Engel and Kollat 1978, Kotler 2002) and measure the planned buying stages.

We design two sets of surveys, one for gauging the mechanisms for contemporaneous sales and the other for the delayed sales. This is because all buyers are either contemporaneous or delayed ones. For the contemporaneous buyers, they did not buy any tickets in later days, so there is no need to survey their planned behavior for this group of contemporaneous buyers. However, for the delayed buyers, we survey them on both their perceived time and location congruence (which should not have a bearing on delayed sales) and planned buying stages. In both surveys, we add more controls: ease-of-use of mobile purchase experience, perceived privacy intrusiveness, purchase channels other than mobile, price sensitivity, and deal proneness, all of which may also affect mobile purchase (Ghose et al. 2012, Luo et al. 2014, Scharl et al. 2005, Fong et al. 2015). Ease-of-use of mobile purchase experience is an important

[5] We acknowledge one reviewer for making this suggestion.

[6] We took steps to increase results validity. First, for those who made purchases, the surveys were conducted the day after purchasing (rolling time windows; if purchased on day 2, the survey was conducted on day 3) so that surveyed users have a more accurate recall of the LMP experience as opposed to many days later. The more days that pass, the weaker the memory and more confounding bias in results. For those who did not make a purchase, the surveys were conducted after three consecutive days of zero sales, which is the 14th day after the experiment date to ensure no confounds introduced by the survey itself.

control variable because it helps account for people's perceptions of how easy to use and act on the LMP (Engel and Kollat 1978). Perceived privacy intrusiveness is an important issue to control given the nature of personal data on private mobile devices (Andrews et al. 2015). Other purchase channels other than mobile help account for channel substitution effects across mobile and other devices (Ghose et al. 2012). In the marketing literature, price sensitivity and deal proneness are found to be important variables that may also affect consumer purchase (Ainslie 1975, Hoch and Loewenstein 1991, Kotler 2002, Scharl et al. 2005). The survey items are shown in the appendix.

For the contemporaneous survey conducted right after the experiment day, the initial survey sample size is 330 mobile users who received the LMP, including 89 purchasers and 241 nonpurchasers in the same day. We cannot survey all nonpurchasers of our field experiment subjects because we were given a fixed number of call center man-hours by the mobile service provider. We use a stratified sampling approach to select a representative sample of 241 nonpurchasers. Among the 330 surveyed users, 280 responded to the survey. This high response rate is expected because the wireless service provider used its customer service call center (rather than the researchers) to conduct the telephone surveys. However, among these 280 respondents, two users did not read the SMS on the spot (theatre). Thus the valid sample size is 278.

Table 5 reports the logistic regression of LMP's contemporaneous sales effect. The results indicate that location and time congruence are significant factors driving LMP's contemporaneous sales effect, even after controlling for mobile usage behaviors and additional covariates such as ease-of-use of mobile purchase experience, perceived privacy intrusiveness, purchase channels other than mobile, price sensitivity, and deal proneness. We note that all of the survey subjects are in the treatment group and received LMP within 500 meters of the movie theatre. However, these subjects reported different degrees of location congruency and time congruency perceptions, which account for the variations in their purchase decisions. The finding supports the real-time marketing and impulsive buy literature (Oliver et al. 1988, Mishra and Mishra 2010, Luo 2005), since LMP may deliver relevant messages at the right time and right place, perceived location and time congruence are indeed possible mechanisms that account for the impulsive, contemporaneous purchases of LMP. Also, among the control variables, the results confirm that mobile promotion informativeness significantly and positively affects contemporaneous sales purchases, whereas consumer interest only marginally affects contemporaneous sales purchase, as shown in Table 5.

**Table 5 Mechanisms for LMP's Contemporaneous Sales Impact with Location and Time Congruence**

| Variable | Model 1 | Model 2 |
|---|---|---|
| *Location Congruence* | | **1.1520**$^{***}$ (**0.2466**) |
| *Time Congruence* | | **1.5390**$^{***}$ (**0.2504**) |
| (Intercept) | −0.7819 (0.3687) | −37.4900 (5.5500) |
| *ARPU* | −0.0040 (0.0036) | −0.0014 (0.0053) |
| *MOU* | −0.0003 (0.0003) | −0.0004 (0.0004) |
| *SMS* | 0.0002 (0.0007) | 0.0006 (0.0011) |
| *GPRS* | 0.0000 (0.0000) | 0.0000 (0.0000) |
| *Promotion Informativeness* | 0.9777$^{***}$ (0.2045) | 0.9860$^{***}$ (0.2112) |
| *Ease-of-use of Mobile Channel* | 0.0017 (0.1584) | −0.0459 (0.1643) |
| *Alternative Purchase Channel* | −0.2011 (0.5975) | −0.2082 (0.6103) |
| *Privacy Intrusiveness* | 0.0114 (0.3748) | 0.0379 (0.3784) |
| *Consumer Interest* | 0.4048$^{*}$ (0.2379) | 0.4023$^{*}$ (0.2377) |
| *Price Conscious* | −0.0638 (0.1994) | −0.0623 (0.2032) |
| *Deal Proneness* | −0.0139 (0.3627) | −0.0132 (0.3732) |

*Note.* Sample size = 278.
$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

For the delayed purchase survey, the initial sample size is 345, including 104 purchasers and 241 nonpurchasers in subsequent days. Among these 345 users, we obtained valid responses from 295. Table 6 indicates that planned buying factors (planned need recognition, planned search, planned evaluation, and planned purchase stages) all have a significant impact on the delayed effect of LMP. Thus, supporting the theory of planned behavior (Engel and Kollat 1978, Kotler 2002, Ghose et al. 2012, Molitor et al. 2012), consumers' buying stages, i.e., need recognition, information search, evaluation of product options, and purchase decision can indeed affect consumer purchases. As such, the data confirm the notion that LMP can facilitate users' need recognition and stored LMP on their mobile devices can be used for future evaluation and decision making, i.e., nonimpulse and planned purchases. Also, for the need recognition stage, LMP could arouse a

consumer of the need for future consumption and prompt the planned buying behavior process. LMP allows promotion messages to be stored in a mobile phone, which facilitates users' access to and retrieval of mobile promotion information, thus affecting consumer information search stage to plan a future purchase. For the evaluation and decision-making stage, LMP enables consumers to easily share information with and solicit opinions from friends and family members, and allows social activity scheduling and coordination with relevant others for the consumption experience, all of which can lead to the delayed sales effects of LMP. Also, among the control variables, the results in Table 6 confirm that alternative purchase channels other than mobile can have a significant negative effect on delayed sales purchases (which suggests channel substitution effects between mobile and other channels; Ghose et al. 2012, Fong et al. 2015), and consumer interest has a significant positive effect on delayed sales purchases.[7]

Interestingly, there is a falsification support for the delayed purchase survey. More specifically, as shown in Table 6, perceived time and location congruence coefficients are not significant for the delayed purchase survey. This insignificant finding suggests that perceived time and location congruence (which are drivers of contemporaneous impulsive purchase), indeed, did not have a bearing on delayed planned purchases from the delayed purchase survey. In other words, since LMP generates need recognition and stored LMP in mobile devices may facilitate product search and evaluation for future consumption decision making, planned behavior stages can indeed account for the nonimpulsive, delayed purchases of LMP. In this sense, our results support that the theory of real-time marketing can be reconciled with the theory of planned behavior in the context of the dynamic sales impact of LMP. Simply put, real-time marketing theory explains the contemporaneous impulsive effects of LMP, and planned behavior theory explains the delayed sales effects of LMP, after accounting for alternative explanations due to consumer-level and mobile-level control variables.

**Table 6 Mechanisms for LMP's Delayed Sales Impact with Planned Recognition, Search, Evaluation, and Purchase Stages**

| Variable | Model 4 | Model 5 |
|---|---|---|
| *Planned Need Recognition Stage* | | 1.3190*** |
| | | (0.2552) |
| *Planned Search Stage* | | 1.0240*** |
| | | (0.2381) |
| *Planned Evaluation Stage* | | 1.3640*** |
| | | (0.2668) |
| *Planned Purchase Stage* | | 1.5760*** |
| | | (0.2984) |
| *Location Congruence* | | 0.2163 |
| | | (0.2339) |
| *Time Congruence* | | 0.0034 |
| | | (0.2203) |
| (Intercept) | −43.5900 | 0.1201 |
| | (6.6250) | (2.0950) |
| *ARPU* | −0.0027 | −0.0013 |
| | (0.0054) | (0.0027) |
| *MOU* | −0.0001 | 0.0000 |
| | (0.0004) | (0.0002) |
| *SMS* | 0.0002 | 0.0005 |
| | (0.0010) | (0.0006) |
| *GPRS* | 0.0000 | 0.0000 |
| | (0.0000) | (0.0000) |
| *Promotion Informativeness* | −0.1847 | −0.1961 |
| | (0.2196) | (0.2284) |
| *Ease-of-use of Mobile Channel* | 0.0001 | 0.0013 |
| | (0.2446) | (0.2582) |
| *Alternative Purchase Channel* | −2.8880** | −2.6552** |
| | (1.1880) | (1.1630) |
| *Privacy Intrusiveness* | −0.5235 | −0.4407 |
| | (0.4921) | (0.4876) |
| *Consumer Interest* | 2.1370*** | 2.1671*** |
| | (0.4241) | (0.4306) |
| *Price Conscious* | 0.0232 | 0.0322 |
| | (0.2674) | (0.2737) |
| *Deal Proneness* | 0.9521 | 0.9528 |
| | (0.5071) | (0.5229) |

*Note.* Sample size = 295.
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

## 4. Discussion and Implications

The ubiquity and location sensitivity of mobile technologies offer a stupendous platform for promotions and consumer targeting. However, many businesses equate LMP solely with impulsive purchases, and such perceptions could undermine the sales value of mobile promotions.

In this research, we conduct a randomized field experiment, survey instruments, and a regression method to investigate the effects of LMP on movie ticket sales. Our analyses reveal two key findings. First, the impact of LMP on consumer purchase decisions is dynamic. LMP not only influences product sales in the contemporaneous period (Butcher 2011, Ververidis and Polyzos 2002) but also induces future sales. The effect is validated by a field experiment of LMP on 22,000 mobile users, along with additional survey and

[7] In the online appendix (available as supplemental material at http://dx.doi.org/10.1287/isre.2015.0586), we conduct additional analyses with archival data. Specifically, to boost the generalizability and external validity, we complemented the randomized field experiment data with a daily archival data of historical LMP campaigns with over three million mobile users. The analyses confirm the dynamic impact of LMP and provide consistent support that LMP not only attracts spontaneous purchases but also creates product awareness for future purchases.

archival evidence of LMP campaigns. To the best of our knowledge, this research is the first in IS and marketing to quantify the dynamic effects of LMP with a unique and large sample of actual mobile users.

Second, we found that surprisingly, LMP has a long-lasting effect on product sales (12 days from the field experiment). These findings highlight the importance of understanding the dynamic effect of mobile promotions in assessing their true effect on product sales. They also suggest the value of accounting for the delayed sales effects of LMP and other mobile promotion efforts. Practitioners and researchers could underestimate the value of mobile promotions if they only calculate the contemporary effects with impulsive buying and neglect the delayed sales effects. For example, the total sales impact of LMP would be remarkably underestimated if only contemporaneous effects are accounted for.

This study also proffers important implications for practitioners. In particular, it demonstrates the sales consequences of LMP in practice. Mobile marketing practitioners (e.g., Levi, Ford, and P&G) are concerned about sales results beyond awareness measures (emarketer.com 2014). We quantify the sales impact of LMP, which helps marketers to defend technology investments and establish the accountability of implementing new ad channels and IT media (Andrews et al. 2015, Gao and Hitt 2012, Ghose and Han 2014, Tambe and Hitt 2012).

The results of this study must be interpreted with caution. Our findings on the dynamic effect of LMP are established in the context of movie ticket purchases. Movie ticket purchases have a number of unique characteristics. In particular, moviegoing is a social event, which requires time-consuming coordination. At the same time, movie tickets are relatively inexpensive and are thus more likely to be subject to impulsive purchase, peer-pressure (Zhang et al. 2011), and word-of-mouth influence (Clemons et al. 2010). Also, our study is limited because we do not have data on where customers live (Forman et al. 2009), although all of our users live in large metropolitan areas. Additional location variables may affect their moviegoing decisions. Given these unique characteristics, it would be worthwhile to investigate other product categories such as restaurants or retailing to substantiate the generalizability of our findings.

Also, our analysis focuses on the effects of mobile promotion on the sales of a type of information goods that has become increasingly digitalized. As more customers watch movies through mobile devices, it will be valuable to consider mobile promotion in the broader context of mobile digital media strategy (Fan et al. 2008, Ghose and Han 2014, Luo et al. 2014). Finally, a potentially important use of time series models is forecasting. Although it is beyond the scope of this paper because we focus on the dynamic effect of LMP, it will be valuable to assess the forecast accuracy of such models in the mobile promotion context.

Finally, to further support the theory of planned behavior, it will be desirable to track subjects' historical geo-travel patterns and study whether subjects who seldom visit the movie theatre are more likely to be affected by planned behavior and make delayed purchases after receiving LMP promotional ads (Andrews et al. 2015, Fong et al. 2015, Ghose et al. 2014).[8] Because of privacy concerns, we were unable to obtain historical mobile location moment-by-moment continuous timestamp data. Future research will be needed to provider a deeper understanding of the long-term dynamic impact of LMP.

In conclusion, this study exemplifies an initial step in quantifying the dynamic sales impact of LMP on the basis of a field experiment of 22,000 real-world mobile users. It reveals that the impact of LMP on consumer purchases is dynamic, with a lasting impact on future sales. Mobile promotions seem to be a promising new marketing channel in the long run. We call for more studies in IS and marketing to further probe novel implications surrounding the tremendous business values of LMP in the mobile era.

## Supplemental Material

Supplemental material to this paper is available at http://dx.doi.org/10.1287/isre.2015.0586.

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[8] We thank an anonymous reviewer for this excellent suggestion.

## Appendix. Survey Instruments

**Table A.1 Survey Instruments for Contemporaneous Purchases**

| Constructs | Survey instruments | References |
|---|---|---|
| Location congruence | When receiving the SMS promotion, you are in close proximity to the movie theatre | Banerjee and Dholakia (2008), Cronin et al. (2000) |
| | Your location at time of receiving the SMS promotion was convenient if you want to watch the movie | |
| Time congruence | It was a congruent timing regarding the moment of receiving the SMS promotion | Merisavo et al. (2006), Cronin et al. (2000) |
| | The timing of receiving the SMS promotion is neither too late nor too early, if you want to watch the movie | |
| *Controls* | | |
| Promotion informativeness | The SMS promotion provides relevant movie information | Xu et al. (2009), Lichtenstein et al. (1997) |
| Privacy intrusiveness | The SMS promotion with the movie offer is intrusive | Luo et al. (2014) |
| Consumer movie interest | When receiving the SMS promotion, you have scheduled to watch the movie | Xu et al. (2009) |
| Alternative purchase channels | Besides the purchase link in the SMS promotion, you have other e-commerce channels to buy movie tickets | Lichtenstein et al. (1997) |
| Ease-of-use of mobile purchase channel | Mobile shopping and payment channel is easy to use when making purchases. | Komiak and Benbasat (2006) |
| Price consciousness | You are generally sensitive to prices when shopping | Luo et al. (2014) |
| Deal proneness | You are generally prone to buy products that offer discounts | Lichtenstein et al. (1997) |

**Table A.2 Survey Instruments for Delayed Purchases**

| Constructs | Survey instruments | References |
|---|---|---|
| Location congruence | When receiving the SMS promotion, you are in close proximity to the movie theatre | Banerjee and Dholakia (2008), Cronin et al. (2000) |
| | Your location at time of receiving the SMS promotion was convenient if you want to watch the movie | |
| Time congruence | It was a congruent timing regarding the moment of receiving the SMS promotion | Merisavo et al. (2006), Cronin et al. (2000) |
| | The timing of receiving the SMS promotion is neither too late nor too early, if you want to watch the movie | |
| Planned behavior: need recognition stage | Receiving this SMS promotion arouses your needs to watch the movie in the future | Soroa-Koury and Yang (2010), Kotler (2002) |
| Planned behavior: information search stage | This SMS promotion is useful for you to search more information of the movies to consider watching it in the future | Goh et al. (2009), Kotler (2002) |
| Planned behavior: product evaluation stage | You could forward this SMS promotion to friends and family to evaluate watching the movie in the future | Soroa-Koury and Yang (2010), Kotler (2002) |
| | Once stored, this SMS promotion is useful for you to evaluate watching it in the future | |
| Planned behavior: purchase decision stage | This stored SMS promotion is easy to retrieve if to make purchase in the future | Soroa-Koury and Yang (2010), Kotler (2002) |
| *Controls* | | |
| Promotion informativeness | The SMS promotion provides relevant movie information | Xu et al. (2009), Lichtenstein et al. (1997) |
| Privacy intrusiveness | The SMS promotion with the movie offer is intrusive | Luo et al. (2014) |
| Consumer movie interest | When receiving the SMS LMP promotion, you have scheduled to watch the movie | Xu et al. (2009) |
| Alternative purchase channels | Besides the purchase link in the SMS promotion, you have other e-commerce channels to buy movie tickets | Lichtenstein et al. (1997) |
| Ease-of-use of mobile purchase channel | Mobile shopping and payment channel is easy to use when making purchases | Komiak and Benbasat (2006) |
| Price consciousness | You are generally sensitive to prices when shopping | Luo et al. (2014) |
| Deal proneness | You are generally prone to buy products that offer discounts | Lichtenstein et al. (1997) |

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