# Factors affecting stickiness and word of mouth in mobile applications

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## Abstract

**Purpose** – The purpose of this study is to investigate user perceptions of mobile app characteristics and interrelationships among identified mobile app characteristics, perceived benefits and post-adoption behaviors.

**Design/methodology/approach** – Using a self-administered online survey ($n = 503$) drawn from a consumer panel of US smartphone users, this study tests the proposed model that explains why stickiness and word of mouth (WOM) are enhanced during the post-adoption stage.

**Findings** – The results indicate that user perceptions of mobile app characteristics, perceived ubiquity, perceived informativeness and perceived personalization are positively associated with mobile app usefulness, thereby leading to increased stickiness and positive WOM intentions. Furthermore, perceived personalization is found to become the strongest predictor of usefulness and playful engagement with the mobile app.

**Research limitations/implications** – The findings are derived from a one-shot correlational study. There is no guarantee that the proposed model establishes causal directions among the latent constructs. Therefore, future research should test the conceptual model in an experimental setting by manipulating the degree and types of ubiquity, informativeness and personalization.

**Practical implications** – The findings of this research provide managerial guidelines for developing effective mobile app strategies involving utilitarian and hedonic benefits, thereby enhancing user stickiness and WOM intentions.

**Originality/value** – This paper is the first attempt to develop a conceptual framework that integrates user perceptions of mobile app characteristics into the underlying process of post-adoption behaviors. It empirically demonstrates the importance of ubiquity, informativeness and personalization in building and sustaining loyal relationships with mobile app users.

**Keywords** Personalization, Mobile marketing, Word-of-mouth marketing

**Paper type** Research paper

## Introduction

With the rapid increase in smartphone adoption, a variety of mobile applications ("apps") have been introduced in the consumer market and have changed the way consumers perform all manners of daily tasks and activities (e.g. shopping, paying bills, finding local businesses, playing games, chatting with peers and getting driving directions) (Kim *et al.*, 2013). As powerful digital marketing and sales tools, mobile apps provide new opportunities to generate revenue for marketers because consumers not only buy apps but also make product/service purchases using retail apps (Taylor and Levin, 2014). The mobile apps market has exponentially grown since the first app store opened in 2008 with 500 apps. According to a recent survey, mobile apps will generate revenues of more than $77bn by 2017 (Capgemini, 2014). To grab the attention of demanding consumers, large corporations like Apple, Android, Blackberry, Microsoft and Google are competing to develop more attractive mobile apps; more than 1.4 million apps were released into the mobile market in February 2015 (Statista, 2015).

In a hyper-competitive mobile app market in which countless new apps are introduced on a daily basis, a critical issue facing mobile marketers is how to maximize consumer stickiness (continued use) and positive word of mouth (WOM) in association with mobile apps, demonstrating that they spend more time on mobile apps and revisiting preferred apps. This is imperative when considering the challenge of recruiting and retaining mobile app customers. For example, user retention for an average mobile app falls to 5 per cent three months after download (Furner *et al.*, 2014). A recent survey also reveals that only 36 per cent of downloaded mobile apps are frequently used and that 62 per cent are deleted within two weeks (Nielson, 2011). A significant number of studies (Davis *et al.*, 1992; Lin *et al.*, 2005; Moon and Kim, 2001; Park *et al.*, 2011) have explored the behavioral intention of individuals to use information technology from the motivation theory perspective. They found that both external and internal benefits motivate individuals to use a technological device. That is, individuals continue to use information technology because they perceive the possible benefits of obtaining utility (extrinsic) and playfulness (intrinsic) from it.

While prior work has focused on the initial adoption stage of mobile technology acceptance (Davis *et al.*, 1989; David and Levin, 2014; Kim *et al.*, 2007), there is a dearth of research that examines the effects of mobile app characteristics on user perceived benefits and post-adoption behaviors. Accordingly, the primary purpose of this study is to investigate relationships among the key features of mobile apps (i.e. ubiquity, informativeness and personalization), perceived benefits (i.e. usefulness and playful engagement) and their post-adoption behaviors, such as stickiness and WOM. Building on the motivation theory (Davis, 1989; Davis *et al.*, 1989), this study proposes a research model that explains why people continue to use mobile apps. The current investigation provides strategic guidelines for mobile marketing practitioners who want to establish optimal levels of stickiness and WOM toward the mobile app.

## Literature review

### Characteristics of mobile apps

Mobile apps have generated increasing interest among marketers because of their positive impact on consumer responses to the sponsoring brand (Hutton and Rodnick, 2009). According to ABI Research (2012), consumers tend to visit stores more often (48 per cent), buy more of the brand's products and services (40 per cent), share their

shopping experience with a friend (35.8 per cent) and talk to others about the brand (30.8 per cent) after downloading mobile apps. Indeed, traditional retailers, such as Target and Walgreens, have received significant mobile traffic from digitally savvy users who search for the best deals in their local stores.

Mobile app marketing differs from other online marketing activities in terms of the following unique characteristics. First, ubiquity reflects the physical aspects of mobile apps that are virtually used anytime and anywhere (Barnes and Huff, 2003; Okazaki and Mendez, 2013). Specifically, Okazaki and Mendez (2013) view the ubiquity of mobile apps as a multidimensional construct consisting of continuity, immediacy and searchability. That is, consumers can use mobile apps at all times (continuity), use them whenever they need them (immediacy) and find target information regardless of origin (searchability).

Second, personalization in mobile apps adds "the ability to provide content and services that are tailored to individuals based on knowledge about their preferences and behaviors" (Adomavicius and Tuzhilin, 2005, p. 84). It has been acknowledged that mobile apps have transformed the way retailers and consumers communicate with each other because retailers can provide more personalized information to consumers through their goods, services and ideas based on consumer permission (Scharl et al., 2005). Kim et al. (2013) pointed out that mobile apps can be distinguished from traditional online and mobile marketing, such as pop-up or banner ads, in terms of permission-based marketing because consumers are allowed to receive personalized information and control over their exposure to information based on opt-in processes. Although traditional online and mobile marketing is based on a push strategy (in that marketers have control over what can be seen), mobile apps are based on a pull strategy (Im and Ha, 2013; Okazaki and Molina, 2012).

Finally, informativeness increases the likelihood of using mobile apps because of their functional and informative features (Kim et al., 2013; Okazaki et al., 2009). Specifically, informational features of mobile apps provide functional experiences (e.g. online banking facilities, specific information about products/brands) and offer utilitarian-based incentives (e.g. mobile coupons, other financial rewards) to users (Kim et al., 2013; Tsang et al., 2004). The informative features of mobile apps have also been shown to improve consumer attitude toward the brand and purchase intention (Bellman et al., 2011).

*Mobile app stickiness and word of mouth as post-adoption behavior*
Academic attention on mobile use has shifted from the mobile technology adoption process that focuses on attaining new customers to post-adoption behavior that stresses continued adoption (Chou et al., 2013; Park et al., 2011; Racherla et al., 2012). Post-adoption behavior has been well explained by stickiness and WOM in the literature (Gillespie et al., 1999; Racherla et al., 2012). Because smartphone users are spending more time (e.g. 2 h and 19 min a day in the USA) than ever before using mobile apps (Perez, 2014), it becomes critical to understand the post-adoption behavior of mobile app users for enhanced mobile communication.

The concept of stickiness was introduced by Gillespie et al. (1999), who examined its relationship to website revisit intention. Stickiness represents the ability to encourage consumers to stay on a website longer (Gillespie et al., 1999) and to increase revisit/reuse intention for a preferred website (Li et al., 2006). In the context of mobile apps, stickiness

refers to the extent to which users frequently return to the mobile apps for continued use (Racherla *et al.*, 2012). For the purpose of this study, we define mobile app stickiness as the degree to which consumers are willing to continue using a particular mobile app.

Furthermore, WOM communication has been known to be another important contributor to the success of mobile apps. WOM can take place through mobile devices or offline. Mobile devices are ideal for WOM communication because individuals can exchange information without time or space restrictions. According to Neilson (2011), nearly 20 per cent of consumers wrote comments on social network sites after shopping, and 16 per cent used their smartphones and tablets to write reviews of their purchases. Moreover, most consumers read other users' reviews or ratings about mobile apps before downloading them (Racherla *et al.*, 2012). In addition to online WOM, offline WOM is an important mechanism that increases mobile app distribution. Recommendation through direct WOM is the second most common way to find new apps, followed by the app store (Racherla *et al.*, 2012). Research conducted in 2014 reveals that about 52 per cent of consumers learn about new apps by conversing with their friends/acquaintances (Graphs.net, 2014).

## Theoretical framework and hypotheses
### Perceived benefits of mobile apps: usefulness and playful engagement
Perceived benefits refer to consumer perceived gains derived from using mobile apps (Chou *et al.*, 2013; Park *et al.*, 2011). The previous studies explored individuals' technology usage behaviors based on the motivation theory (Davis *et al.*, 1992; Lin *et al.*, 2005; Moon and Kim, 2001). According to the motivation theory, individuals are motivated to use new technologies based on whether and to what extent they perceive extrinsic benefits (e.g. usefulness and ease of use) and intrinsic benefits (e.g. playful engagement and enjoyment) (Davis *et al.*, 1992; Deci and Ryan, 1985; Moon and Kim, 2001; Yang *et al.*, 2012). Extrinsic benefits relate to goal-driven activities for task performance; intrinsic benefits are associated with enjoyable activities that enhance individuals' inherent interests, regardless of goal orientation (Chou *et al.*, 2013; Deci and Ryan, 1985). Similarly, Kim *et al.* (2007) point out that perceived benefits, which consist of cognitive benefits (i.e. extrinsic factors) and affective benefits (i.e. intrinsic factors), influence an individual's use of information technology.

Traditionally, the technology acceptance model (TAM) has been widely used by researchers for predicting individuals' behavioral intention to adopt information technology (Davis *et al.*, 1989). TAM suggests that two specific beliefs — ease of use and usefulness — are the primary reasons for adopting new technology. Usefulness refers to an individual's belief that adopting new technology might enhance his or her job performance, while ease of use is defined as his or her belief that using it requires little effort (Davis, 1989). Recent studies indicate that usefulness of mobile apps helps users to achieve goals and job performance, and therefore increases their usage during both pre-and post-acceptance stages (Chou *et al.*, 2013; Kim *et al.*, 2013). However, ease of use mainly influences consumer behavioral intentions at the initial stage of information technology adoption and tends to diminish in a later stage (Davis *et al.*, 1989; Karahanna *et al.*, 1999). Accordingly, this study includes only usefulness as an extrinsic benefit that may influence consumer post-adoption behavior.

Given a previous research assertion on the interplay of affective and cognitive dimensions, extrinsic benefits cannot solely explain consumer behavior associated with

mobile apps (Chou *et al.*, 2013; Debu *et al.*, 2003). To this end, recent studies use the term "playfulness" as an intrinsic motivation that influences consumer post-adoption behaviors in association with mobile apps (Chou *et al.*, 2013; Maghnati and Ling, 2013). For example, Maghnati and Ling (2013) reveal that playful experience with mobile apps leads to more positive attitudes toward the apps because mobile users are more likely to engage in an activity for its own sake when the activity generates good feelings and pleasurable experiences. Thus, we conceptualize playful engagement as an intrinsic benefit that users can gain by having enjoyable experiences with mobile app features. Based on these reasons, the current study proposes that usefulness serves as an extrinsic benefit, whereas playful engagement serves as an intrinsic benefit for using mobile apps.

*The effects of mobile apps characteristics on usefulness and playful engagement*
The ubiquitous feature of mobile apps provides user benefits, such as time saving and spatial flexibility. While using mobile devices, consumers can download various types of mobile apps, use them to gain real-time information and make transactions from wherever they are (Kim *et al.*, 2013). Such "anywhere, anytime" benefits enhance usefulness of mobile features, leading to positive attitudes toward mobile apps (Okazaki and Molina, 2012; Tojib and Tsarenko, 2012).

Prior research also indicated that the mobile service that can be reachable at anytime from anywhere heightens consumer positive emotion or affection (Bolton and Drew, 1991; Shavitt *et al.*, 1998). That is, the omnipresence of mobile services enables users to find all kinds of information and communicate with other users without any time or place restrictions (Tojib and Tsarenko, 2012). By using mobile entertainment apps (e.g. game, shopping, SNS and instant messaging) that are accessible to wireless networks, consumers can stave off boredom by engaging in an intrinsically playful experience, whether they are on a short break or using public transportation (Tojib and Tsarenko, 2012). Based on these findings, the following hypothesis is proposed:

*H1.* Perceived ubiquity will be positively related to (a) mobile app usefulness and (b) playful engagement.

The informative features of mobile apps provide both extrinsic and intrinsic benefits (Kim *et al.*, 2013). The information provided via mobile apps (e.g. mobile coupons, banking facilities and traffic information) meets the consumer goal of increasing convenience and saving money. For example, the "Red Laser" app allows users to scan product barcodes using the camera on an iOS device. By using this app, consumers are able to find the lowest price across multiple stores and websites, increasing shopping efficiency (Yang *et al.*, 2012). Methlie and Pederson (2005) also demonstrate that the content (i.e. informativeness and functionality) of a mobile service is a primary factor that increases usefulness.

Furthermore, the informativeness of mobile apps provides enjoyable experiences to consumers. For instance, mobile apps like shopping and chat rooms allow consumers to receive intrinsic enjoyment and entertainment benefits (Kim *et al.*, 2013). In addition, these experiential benefits can be obtained by using promotional coupons, by obtaining information about new fashions and trends, and by sharing sales information with friends (Yang *et al.*, 2012). Taking these considerations into account, the following hypothesis is proposed:

*H2.* Perceived informativeness will be positively related to (a) mobile app usefulness and (b) playful engagement.

The personalization feature of mobile apps also provides multiple benefits to users. The personalized services based on location accuracy directly influence task performance and enhance perceived usefulness (Ho, 2012). That is, when individuals perceive the personalized mobile service to be precise, they are extrinsically motivated to use the service. GPS-enabled mobile apps allow consumers to receive product information based on their actual location and to use further customized services. Consumers can also receive numerous coupons and daily deals near the current location using location-based mobile apps, such as GeoQpons and Yowza (Im and Ha, 2013). As another example, GasBuddy is a mobile app that helps users find the cheapest gas station near them. Furthermore, providing personalized service and information can reduce consumer irritation by eliminating irrelevant messages and thereby enhancing usefulness of mobile apps (Tan and Chou, 2008).

Moreover, when individuals perceive that personalized mobile services provide a novel or enjoyable experience, they are intrinsically motivated to use them (Ho, 2012). For example, the mobile app Beautiful Me offers 3D photo augmentation and provides personalized skincare recommendations to consumers. In this way, personalized mobile apps enable consumers to create their enjoyable experiences, leading to more favorable behavioral intention. Hence, the following hypothesis is proposed:

*H3.* Perceived personalization will be positively related to (a) mobile app usefulness and (b) playful engagement.

*The effects of usefulness and playful engagement on stickiness and word of mouth*
The motivation theory postulates that both extrinsic and intrinsic benefits serve as motivational factors that significantly influence behavioral intention and actual behavior (Chou *et al.*, 2013; Deci and Ryan, 1985; Davis *et al.*, 1998). The TAM model, in particular, suggests that usefulness (extrinsic benefit) predicts user acceptance and actual usage of technology (Chou *et al.*, 2013; Davis *et al.*, 1989; Karahanna *et al.*, 1999; Venkatesh, 2000).

A significant body of theoretical and empirical evidence also exists regarding the influence of intrinsic benefits (e.g. playfulness or enjoyment) on technology usage (Fang *et al.*, 2006; Moon and Kim, 2001; Nysveen *et al.*, 2005). Moon and Kim (2001) suggest that playfulness has a positive impact on behavioral intention in World Wide Web usage. In the context of mobile marketing, enjoyment is found to become a key predictor of behavioral intentions to use mobile services (Nysveen *et al.*, 2005). Similarly, Wu *et al.* (2008) claim that playfulness functions as a significant antecedent of consumer stickiness to a hedonic information system. Consistent with the aforementioned discussion, Okazaki (2008) demonstrates that both the cognitive value (extrinsic benefit) and the entertainment value (intrinsic benefit) of the mobile-based referral campaign generate enhanced attitudes toward the campaign, thereby leading to greater participatory intentions. There is further evidence that both usefulness and enjoyment of mobile apps have significant effects on user satisfaction and intention to continue to use mobile apps (Chou *et al.*, 2013).

Based on these findings, we expect that when consumers perceive extrinsic and intrinsic benefits from using mobile apps, they are likely to continue using the mobile

app (i.e. stickiness) and engage in WOM. Therefore, we propose the following hypotheses:

*H4.* Mobile app usefulness will be positively related to (a) stickiness and (b) WOM toward the mobile app.

*H5.* Playful engagement will be positively related to (a) stickiness and (b) WOM toward the mobile app.

### The link between stickiness and WOM

There has been growing consensus among marketing scholars and practitioners that enhancing website stickiness leads to positive outcomes, such as long-term loyalty, positive WOM and greater revenues (Lin, 2007; Lin *et al.*, 2010; Wang, 2010). However, there is scant research that examines the relationship between stickiness and WOM in mobile apps. Racherla *et al.* (2012) suggest that stickiness is formed when there are strong connections among app users, and that strong connections increase the intention to spread positive WOM. Furthermore, if consumers stick to specific mobile apps, they are more likely to spread positive WOM through face-to-face interactions and social network sites, such as Facebook and Twitter. Based on these ideas, the following hypothesis is proposed:

*H6.* Stickiness will be positively related to WOM toward the mobile app.

Based on the proposed hypotheses, the current study developed the research model shown in Figure 1. The model posits the relationships among the characteristics of mobile app (i.e. ubiquity, personalization and informativeness), perceived benefits (i.e. usefulness and playful engagement) and post-adoption behaviors (i.e. stickiness and WOM) related to mobile app.
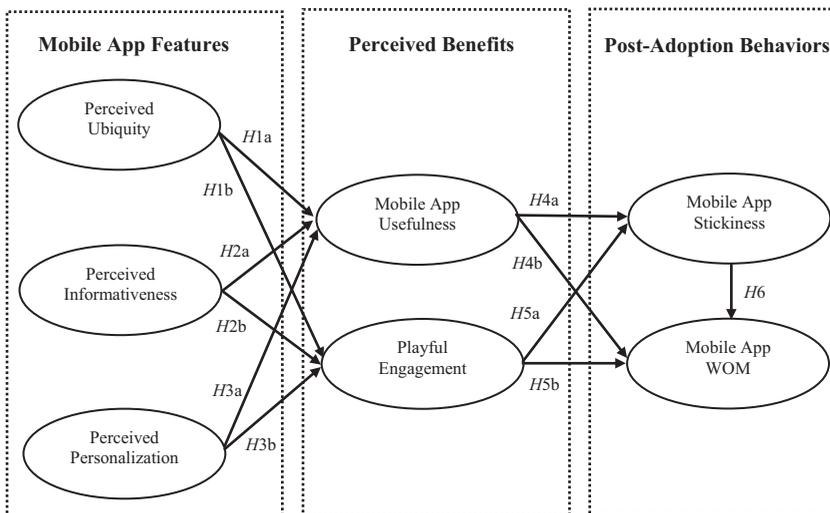


Figure 1.
Proposed model

## Method

### Sample

To recruit participants for our study, we used a consumer panel of US smartphone users through Qualtrics, the world's leading online survey company. Potential participants were randomly selected from the online panel and received the survey invitation via email. Among them, 534 panel members responded to the survey. After eliminating incomplete surveys, we secured a total of 503 respondents. Among these, 258 were female and 245 were male. Their ages ranged from 18 to 67 years, with the median age of 32 years. The ethnic groups consisted of Anglo-Americans/Caucasians (75.5 per cent), Asian Americans (7.3 per cent), African-Americans (6.5 per cent) and Hispanics (5.1 per cent).

Respondents were first asked to name a mobile app they frequently used and report how long they had used this app. A total of 149 mobile apps were identified (e.g. Amazon, e-Bay, Starbucks, Facebook, Bank of America, CNN and Target). The app named by each respondent was automatically embedded in the remaining questions pertaining to the mobile app. The largest group of the respondents used the self-identified mobile app about two to four times a week (45 per cent), followed by several times a day (16.3 per cent) and once a day (12.9 per cent).

### Measures

A seven-point Likert-type scale (1 = strongly disagree, 7 = strongly agree) was used for measurement of items. The measurement items of perceived personalization were adapted from Baek and Morimoto (2012); Srinivasan *et al.* (2002); perceived informativeness, from Tsang *et al.* (2004); perceived ubiquity, from Okazaki *et al.* (2009); usefulness, from Salisbury *et al.* (2001); playful engagement, from Mahatanankoon (2007); stickiness, from Agarwal and Karahanna (2000); and WOM, from Zithaml *et al.* (1996). The measurement items can be found in Table I.

## Results

### Measurement model

We first conducted a confirmatory factor analysis (CFA) using AMOS 21 to assess whether the observed variables had appropriate properties to represent each latent construct (Baek and Morimoto, 2012). Our model estimation used the maximum likelihood estimation approach for CFA. The overall goodness-of-fit values were satisfactory: $\chi^2 (302) = 1,160.53$ ($p < 0.001$), $\chi^2/\mathrm{df} = 3.84$; comparative fit index (CFI) = 0.92; Tucker–Lewis Index (TLI) = 0.91; normed fit index (NFI) = 0.90; and root mean square error of approximation (RMSEA) = 0.08. Upon confirming the measurement model's overall fit, we further examined the reliabilities of all constructs. As a result, composite reliabilities were found to be satisfactory because they exceeded the generally accepted minimum of 0.70 recommended by Hair *et al.* (1998), as illustrated in Table I.

To check convergent validity and discriminant validity, we adopted the approach from Fornell and Larcker (1981). First, convergent validity was achieved because all standardized factor loadings for individual indicators (ranging from 0.63 to 0.94) were statistically significant at the 0.001 level (Anderson and Gerbing, 1998). Next, the average variance extracted (AVE) was calculated for a more rigorous testing of convergent validity. AVE values (ranging from 0.57 to 0.85) were greater than 0.50, indicating satisfactory convergent validity. Factor loadings and AVE estimates for all

| Construct | CR | AVE | Standardized loading |
|---|---|---|---|
| *Perceived ubiquity* | 0.88 | 0.59 | |
| Using the ___ mobile app is an efficient way to manage my time | | | 0.68 (17.05)*** |
| Using the ___ mobile app makes me life easier | | | 0.65 (15.90)*** |
| Using the ___ mobile app fits with my schedule | | | 0.79 (20.71)*** |
| Using the ___ mobile app enables me to find information at any place | | | 0.83 (22.28)*** |
| Using the ___ mobile app fits any location, whenever I go | | | 0.85 (22.90)*** |
| *Perceived informativeness* | 0.85 | 0.73 | |
| Using the ___ mobile app is a good source for timely information | | | 0.84 (21.57)*** |
| Using the ___ mobile app provides the information I need | | | 0.87 (22.86)*** |
| *Perceived personalization* | 0.83 | 0.57 | |
| The ___ mobile app makes purchase recommendations that match my needs | | | 0.74 (18.41)*** |
| The ___ mobile app enables me to order products/services that are tailor-made for me | | | 0.78 (19.65)*** |
| The push notifications and promotions that the ___ mobile app sends to me are tailored to my situation | | | 0.75 (18.79)*** |
| The ___ mobile app makes me feel that I am a unique customer | | | 0.76 (19.18)*** |
| I believe that the ___ mobile app is customized to my needs | | | 0.63 (14.89)*** |
| *Mobile app usefulness* | 0.87 | 0.59 | |
| Using the ___ mobile app enables me to accomplish my tasks more quickly | | | 0.90 (25.15)*** |
| Using the ___ mobile app makes it easier for me to carry out my tasks | | | 0.90 (25.21)*** |
| Overall, the ___ mobile app is useful | | | 0.68 (16.74)*** |
| *Playful engagement* | 0.95 | 0.75 | |
| I am imaginative when using the ___ mobile app | | | 0.87 (24.60)*** |
| I am flexible when using the ___ mobile app | | | 0.71 (18.15)*** |
| I am creative when using the ___ mobile app | | | 0.92 (27.04)*** |
| I am playful when using the ___ mobile app | | | 0.89 (25.39)*** |
| I am original when using the ___ mobile app | | | 0.88 (25.04)*** |
| I am inventive when using the ___ mobile app | | | 0.91 (26.22)*** |
| *Mobile app stickiness* | 0.95 | 0.85 | |
| I plan to keep using the ___ mobile app in the future | | | 0.90 (26.02)*** |
| I intend to continue using the ___ mobile app in the future | | | 0.94 (28.01)*** |
| I expect my use of the ___ mobile app to continue in the future | | | 0.93 (27.30)*** |
| *Mobile app WOM* | 0.92 | 0.78 | |
| I would say positive things about the ___ mobile app to other people | | | 0.87 (23.92)*** |
| I would recommend the ___ mobile app to someone who seeks my advice | | | 0.91 (25.86)*** |
| I would encourage friends and relatives to download the ___ mobile app | | | 0.87 (24.25)*** |

**Notes:** CR = composite reliability; AVE = average variance extracted; *t*-values are shown in parentheses; ___ indicates the name of a particular mobile app self-identified by a respondent; *** $p < 0.001$

**Table I.**
Measurement items

constructs can be found in Table I. Discriminant validity was established because the AVE estimate of each latent construct was greater than the squared correlations between each pair of latent constructs in the measurement model, as depicted in Table II.

*Structural model and hypothesis testing*
The full structural model was analyzed using the maximum likelihood estimation method with AMOS 21. The overall goodness-of-fit values were satisfactory: $\chi^2(309) = 1,219.93$ $p < 0.001$, $\chi^2/df = 3.94$, CFI = 0.92, TLI = 0.91, NFI = 0.89, and RMSEA = 0.08. The standardized path coefficients for the proposed model are illustrated in Figure 2. Specifically, perceived ubiquity was the strongest predictor of mobile app usefulness ($\beta = 0.51$, $t$-value = 7.17, $p < 0.001$; supporting *H1a*), whereas it was not significantly related to playful engagement ($\beta = 0.08$, $t$-value = 1.05, $p = 0.29$; rejecting *H1b*). Perceived informativeness had a positive relationship with usefulness ($\beta = 0.28$, $t$-value = 4.44, $p < 0.001$; supporting *H2a*), whereas its relationship with playful engagement was not significant ($\beta = -.05$, $t$-value = $-.63$, $p = 0.53$; rejecting *H2b*). Perceived personalization had positive effects on mobile app usefulness ($\beta = 0.10$, $t$-value = 2.32, $p < 0.05$; supporting *H3a*) and playful engagement ($\beta = 0.70$, $t$-value = 11.02, $p < 0.001$; supporting *H3b*). Mobile app usefulness was found to be a strong predictor of mobile app stickiness ($\beta = 0.50$, $t$-value = 10.96, $p < 0.001$; supporting *H4a*) and WOM ($\beta = 0.18$, $t$-value = 4.21, $p < 0.001$; supporting *H4b*). Playful engagement also had positive impacts on stickiness ($\beta = 0.12$, $t$-value = 2.79, $p < 0.01$; supporting *H5a*) and WOM ($\beta = 0.10$, $t$-value = 2.66, $p < 0.05$; supporting *H5b*). Finally, mobile app stickiness was found to increase WOM ($\beta = 0.61$, $t$-value = 13.44, $p < 0.001$; supporting *H6*). Overall, all path coefficients were statistically significant, except for *H1b* and *H2b*.
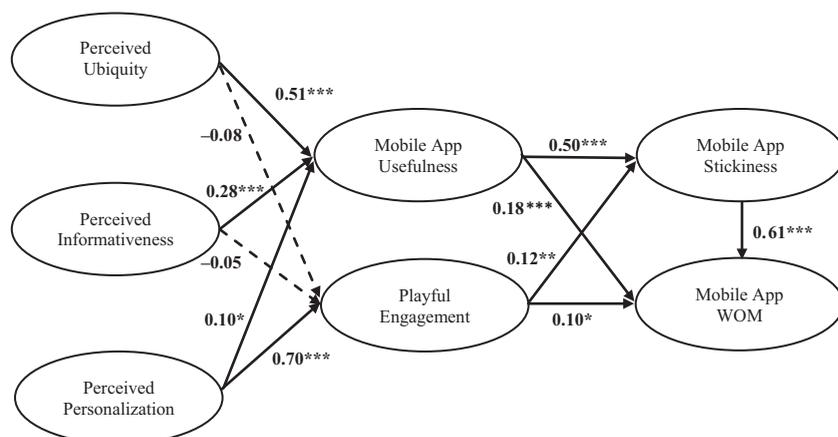
**Discussion**
*Theoretical implications*
This study proposed and empirically tested a conceptual framework to enhance our understanding of how user perceptions of mobile app characteristics (i.e. ubiquity, informativeness, and personalization) influence perceived benefits (i.e. usefulness and playful engagement) and eventually post-adoption behaviors (i.e. stickiness and WOM). The findings of this study provide three major theoretical implications. First, the current study develops and tests an integrated model that examines how these key features of mobile apps bring forth post-adoption behavioral intention. While previous studies

| Construct | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Perceived ubiquity | *0.77* | | | | | | |
| Perceived informativeness | 0.76* | *0.86* | | | | | |
| Perceived personalization | 0.55* | 0.45* | *0.71* | | | | |
| Mobile app usefulness | 0.75* | 0.68* | 0.49* | *0.83* | | | |
| Playful engagement | 0.26* | 0.20* | 0.63* | 0.26* | *0.87* | | |
| Mobile app stickiness | 0.53* | 0.55* | 0.35* | 0.48* | 0.25* | *0.92* | |
| Mobile app WOM | 0.53* | 0.54* | 0.44* | 0.48* | 0.29* | 0.73* | *0.88* |

**Table II.** Correlation matrix

**Notes:** Diagonal numbers in italic refer to the square root of AVE (average variance extracted) values; Off-diagonal numbers are the correlation coefficient between latent constructs; $*p < 0.05$

Perceived
Ubiquity

Perceived
Informativeness

Perceived
Personalization

Mobile App
Usefulness

Playful
Engagement

Mobile App
Stickiness

Mobile App
WOM

0.51***

−0.08

0.28***

−0.05

0.10*

0.70***

0.50***

0.18***

0.12**

0.10*

0.61***

**Notes:** $\chi^2(309) = 1{,}219.93$ (p < 0.001), GFI = 0.83, CFI = 0.92, TLI = 0.91,
NFI = 0.89, RMSEA = 0.08, SRMR = 0.07; Standardized path estimates that are not
statistically significant (p > 0.05) are indicated with dashed lines; * p < 0.05,
** p < 0.01, *** p < 0.001

**Figure 2.**
Results of structural
model

have examined a single feature of mobile service (e.g. ubiquity) (Okazaki and Mendez, 2013), personalization (Tan and Chou, 2008), entertainment (Tojib and Tsarenko, 2012) or informativeness (Kim *et al.*, 2013), this study proposed an integrated model to explore how the three key features of mobile apps serve as motivating factors of users' perceived benefits and behavioral intentions.

The second contribution lies in extending the research on post-adoption behaviors of mobile communication to mobile apps. Although a number of researchers have argued that enhancing post-adoption behavior is important for the success of mobile service (Furner *et al.*, 2014; Racherla *et al.*, 2012), empirical research on stickiness and WOM has been lacking in the case of mobile apps. To fill this gap, the current study provides empirical evidence of linkage between motivators of mobile apps usage and outcomes of post-adoption behavior, such as stickiness and WOM. We also found a significant and positive impact of stickiness on WOM regarding the use of mobile apps. Moreover, the results showed that the relationships between users' perceived benefits and WOM were stronger through stickiness. Hence, this study provides preliminary insights into the role of stickiness as a potential mediator between perceived benefits and positive behavioral outcomes.

Finally, this study extends the work of previous studies on the TAM, which primarily focuses on the cognitive processes of consumer adoption behavior through ease of use and usefulness, by adding an affective factor – playful engagement – to the existing framework. Consistent with the premise of motivational theory suggested in previous studies (Davis *et al.*, 1992; Moon and Kim, 2001), our findings demonstrate that both intrinsic (i.e. playful engagement) and extrinsic (i.e. usefulness) motivational factors play important mediating roles in establishing the interrelationships between mobile app characteristics and post-adoption behaviors. However, unlike the findings of earlier studies that indicated a significant role of the intrinsic benefit associated with

adopting mobile service (Chou *et al.*, 2013; Moon and Kim, 2001; Tan and Chou, 2008), our finding suggests that the extrinsic benefit exerts a stronger effect on users' post-adoption behavior.

*Managerial implications*
The findings of the current study also provide important managerial implications to mobile marketers. By demonstrating the structural relationships that mobile apps characteristics have with users' perceived benefits and outcome variables, this study sheds light on useful strategies for developing effective content for mobile apps. In particular, our findings suggest that emphasizing personalized features of mobile apps (e.g. adding a personal touch to upgrade a mobile app or sending customized push notification/in-app messages) yields more favorable perceptions of playful engagement and usefulness, which in turn play a critical role in building mobile app stickiness and WOM. As we demonstrated in our proposed model, perceived personalization is a strong driver of both usefulness and playful engagement. Accordingly, mobile marketers should harness the power of more customized content and notifications through fun- and entertainment-based apps. Furthermore, mobile marketers need to focus on developing the informative or time- and location-flexible features of mobile apps to increase user perception of usefulness and continued usage of mobile apps. In particular, our results suggest including real-time and location-based information (e.g. stock trading, weather, and traffic information) in mobile app promotion efforts can provide convenience to mobile app users and stimulate their post-adoption behaviors.

In accordance with the interplay of the affective and cognitive dimensions of mobile service and their effects on actual service consumption (Tojib and Tsarenko, 2012), mobile marketers need to provide mobile app users with extrinsic and intrinsic benefits to increase stickiness and positive WOM. Specifically, the results of this study revealed that the perceived extrinsic benefit exhibits a stronger effect between three key features of mobile apps and post-adoption behaviors than the perceived intrinsic benefit. Thus, practitioners should pay particular attention to increasing user convenience and efficiency, thereby building a long-term relationship with their consumers.

In sum, retaining existing customers is vital to the success of mobile app marketing in the highly competitive world of mobile app technology, in which countless new apps are introduced on a daily basis in virtual stores. Major mobile apps platforms (i.e. Apple and Android), which traditionally ranked the apps based on the popularity or number of downloads, have recently decided to rank them based on loyalty and stickiness (Furner *et al.*, 2014). Thus, the findings of this study provide practical advice to marketers on how to enhance user stickiness and WOM.

*Limitations and suggestions for future research*
Although our findings suggest rich insights into factors affecting consumer usage of and response to mobile apps, the current study has some limitations that should be acknowledged. First, our findings were derived from a one-shot correlational study. There is no guarantee that our proposed model establishes causal directions among the latent constructs. Therefore, future research can test the conceptual model in an experimental setting by manipulating the degree and types of ubiquity, informativeness and personalization. Furthermore, researchers could examine whether the relationships that the motivational factors have with both stickiness and WOM are stronger or

weaker with different types of execution in a mobile app (e.g. informational or entertainment content) (Bellman *et al.*, 2011). Another limitation is that our research focused on the positive effects of mobile app user motivation on stickiness and WOM. Future research could investigate whether the backfire effect might occur when consumers perceive mobile apps to be too universal and personalized. In particular, given the privacy concerns and irritations as major barriers, future research can explore the relationships between enablers and inhibitors in adopting customized mobile app services.

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