# Acceptance of mobile location-based advertising: a privacy calculus model

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## Abstract

Location-based advertising is an innovative means for advertisers to reach consumers by sending messages directly to their mobile phones which have been tailored according to their real-time geographic location. Researchers and practitioners are currently looking to better understand the consumers' acceptance intentions of location-based mobile advertising due to the drastic growth of mobile in recent years. Drawing upon the privacy calculus theory, this study builds a research model to examine the risks and benefits influencing acceptance intention towards mobile location-based advertising. A standardised survey was designed to test the conceptual model and 252 valid responses confirmed the significance of the constructs proposed: internet privacy concerns, intrusiveness, personalization and monetary rewards.

*Keywords:* Mobile locations-based advertising (MLBA); privacy calculus theory; internet privacy concerns (IPC); intrusiveness; personalization; monetary rewards

## Introduction

The rapid technological advances of mobile phones, including multimedia and broadband services, as well as their successful rate of penetration, have brought about new platforms for brand-consumers' interactions (Shankar & Malthouse 2007). In particular, advertisers are now able to send adverts directly to consumers via the consumers' mobile phones. A recent report by eMarketer (2016) indicates that total mobile advertising revenues grew from $28.5 billion in 2015 to $40.2 billion in 2016. Given the ubiquity and highly personal nature of mobile phones, people carry them at all times and are able to use them almost anywhere (Okazaki, Li, & Hirose 2009; Park, Shenoy, & Salvendy 2008). One reason for brands migrating to mobile communication platforms is that it allows for more personal, interactive and almost instant communications than that of traditional marketing communications (Chaffey & Chadwick 2012). The rapid growth of mobile advertising means that marketers are in continual competition to find new and interesting ways of maximising the medium's potential.

One of the most recent advances in this channel is mobile location-based advertising (MLBA), defined as highly individualised marketing messages that are tailored according to the consumer's real-time geographic location (Xu et al. 2009) to target consumers based on their proximity to relevant places (Unni & Harmon 2007). Therefore, the location aspect of MLBA is more likely to stimulate unplanned purchase or trigger the final push to purchase by reaching consumers when they are close to a store (Andrews et al. 2016).

While MLBA has the potential to add value to consumers by placing highly personalized ads in a location-specific context, due to the technology involved in tracking and utilizing consumer's geographic location, MLBA might be perceived as intrusive and as an invasion of personal privacy (Limpf &Voorveld 2015; Zhao, Lu, &Gupta 2012). In essence, this tension

between personalization and privacy represents the *personalisation-privacy paradox*, which follows from marketers exploiting users' information in order to send them personalised ads, coupled with the users' worry about the security of their private data (Sutanto et al. 2013). Prior research has examined this paradox primarily through the lens of the privacy calculus theory (Keith et al. 2010; Xu et al. 2011), arguing that consumers make privacy-based decisions by evaluating the benefits any information may bring against the risk of its disclosure (Dinev &Hart 2006).

In order to better understand the double-edge nature between the value that consumers may identify in receiving personalised messages, and the perceived privacy concerns regarding personal information disclosure, which is fundamental to the success of MLBA this study empirically tests a conceptual model that illustrates the drivers proposed to influence MLBA acceptance intentions.

**Theoretical background and proposed model**

The privacy calculus theory has been widely used to provide better understanding on how consumers evaluate the fairness of disclosing personal information to marketers (Keith et al. 2010; Sun et al. 2015; Xu et al. 2011). The privacy calculus theory claims that consumers arrive at their privacy decisions by weighing up potential benefits against potential risks that may be generated by the disclosure of their personal information (Dinev &Hart 2006). This is a variant of the equity, or justice, theory which claims that the justice perceptions of an individual are derived from the ratio between benefits and cost (Adams, 1963 cited in Sun et al. 2015). Low privacy risks result in a perception of a higher benefit and also, therefore, justice. Conversely, consumers are more likely to perceive information disclosure as being unjust when privacy risks are relatively high, despite recognising the benefits of disclosing said information (Sun et al. 2015).

Privacy, with regards to the online environment, refers to individuals' awareness of and how much they are able to control the collection and usage of personal data (Belanger &Crossler 2011; Hann et al. 2007). More specifically, Hong &Thong (2013) identified six factors of Internet privacy concerns (IPC) (secondary usage, error, improper access, control and awareness), and emphasised control and awareness as key dimensions. More recently, the view that privacy can be conceptualised as a commodity (Davies 1997), to be traded with and marketed, has gained popularity (Jentzsch, Preibusch, &Harasser 2012; Smith, Dinev, &Xu 2011). This later view implies that an individual's decision to willingly disclose private information is made by weighing the risk of disclosing information with the benefits the sharing of this information will bring them (Keith et al. 2013).

Building from previous studies findings, that applied the privacy calculus theory in the e-commerce context (Dinev & Hart 2006; Dinev et al. 2013; Kim 2008; Li, Sarathy, & Xu 2011), this research empirically test and evaluate key risk and benefit components in the model that have not been analyzed together before in an understudied MLBA context, where the issue of privacy becomes of paramount importance as the information available to the marketer may be of a high volume and potentially-sensitive in nature. The premise used in the proposed model in Fig. 1, is that both perceived risk and perceived benefit influence consumers' acceptance of MLBA.

According to the privacy calculus theory, willingness to disclose information is negatively associated with perceived risk and positively associated with perceived benefit. By disclosing

location-based information with marketers, consumers may benefit by receiving personalized ads (Zhao et al. 2012) tailored according to the users' interests, activities, locations, and time of the day**,** as well as monetary rewards (Premazzi et al. 2010; Ward, Bridges, & Chitty 2005), thus driving users more open to MLBA. On the other hand, because location-related information is highly sensitive (Zhao et al. 2012), users may be worried about their personal information been misuse and refute to disclose information and use MLBA. Each component of the proposed MLBA acceptance model in Fig. 1 will be presented in the following sections.

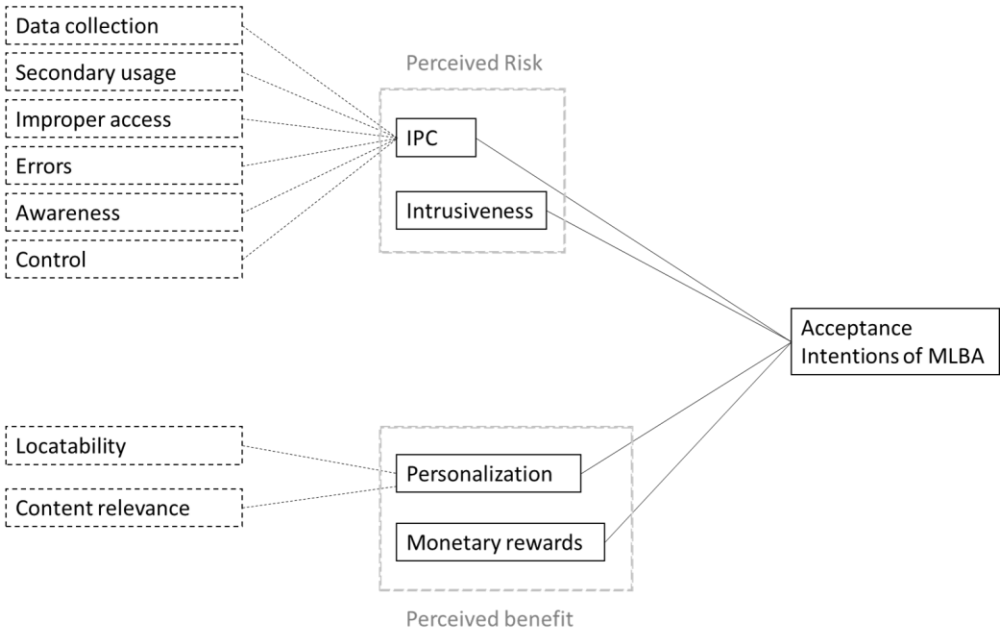


Fig. 1. MLBA acceptance conceptual model

*Perceived Risk of Location Information Disclosure*

In the e-commerce context, perceived risk has been defined as the uncertainty, discomfort and/or anxiety discerned by users when he/she cannot anticipate the consequences of disclosing personal information online (Geetha & Rangarajan 2015). Although perceived risk has been conceptualised as a multidimensional concept involving financial, performance, physical, physiological and social risk (Jacobby & Kaplan, 1972 cited in Sun et al 2015), this research focused on the privacy concerns as a particularly salient facet in Internet context (Featherman & Pavlous, 2003).

IPC refers to the degree to which an internet user is concerned about how and to what extent his or her personal information is collected and used by an online entity (Malhotra, Sung, & Agarwal 2004; Son & Kim 2008). This implies there is a difference between users' expectations of how their personal information is being handled and the reality of its handling. Previous research has identified six main dimensions that shape IPC (Malhotra, Kim, & Agarwal, 2004; Hong & Thong 2013), namely (1) data collection, (2) secondary usage, (3) improper access, (4) error, (5) control and (6) awareness. Collection is defined as the degree to which a person is concerned about the amount of individual-specific data possessed by an online entity. Secondary usage of data as the extent to which an individual is concerned that personal

information is collected for one purpose, but used for another without authorization. Improper access of data as the degree to which a person is concerned about their personal data being stolen or available to people not authorised. Error, as the degree to which a person is concerned that protection against deliberated and accident errors in personal data are inadequate. Control refers to the degree to which a person is concerned that he or she does not have adequate control over his or her personal information and how it is collected and used by others. Finally, awareness of data usage represents an individual's understanding of privacy conditions and practices.

The perceived intrusiveness of a mobile message is critical, as intrusiveness is negatively related to advertisement value (Okazaki 2004). Intrusiveness in the context of MLBA can be defined as a psychological reaction to unsolicited push location-based advertisements sent to user's mobile phone that interfere with the consumer's ongoing cognitive processing (Truong & Simmons 2010). Such intrusiveness leads to negative emotions (e.g., disturbance and irritation) and behaviour effects such as advertisement avoidance (Edwards, Li, & Lee 2002; Wehmeyer 2007), even if they have signed up to receive them (Rau et al. 2011; Varnali 2012). More specifically, Truong & Simmons (2010) identified specific constructs when assessing perceived intrusiveness**:** distracting, disturbing, forced, interfering, intrusive, and obtrusive.

*Perceived Benefit of Location Information Disclosure*

The adoption of a particular technology depends greatly upon the benefits the technology offers (Rogers, 1995 cited in Beldad & Citra 2015). In this study, perceived benefit refers to the perception of positive outcomes of disclosing location and personal information online. Perceived benefit relates to motivator factors, which can be utilitarian or hedonic, that induce positive satisfaction (Lee, Park, & Kim 2013). Zhao, Lu, & Gupta (2012) argue that perceived benefit can outweigh the perceived risk of using location-based services. In MLBA the consumers' fear of losing control of personal information, in particular location information, and the risk of receiving irritating messages, is compensated by the value of personalization (Baek & Morimoto 2012; Xu & Gupta 2009; Xu et al. 2011) and monetary rewards (Premazzi et al. 2010; Ward, Bridges, & Chitty 2005).

Personalisation is identified as a utilitarian benefit, brought about by the disclosure of disclosing personal information (Sun et al. 2015). In the context of personalised advertisements, systems automatically track, gather and explicitly use each individual's personal information to deliver tailored advertising messages based on users' profiles (Xu, Liao, & Li 2008; Sundar & Marathe 2010). By sending the consumer messages that are tailored to their interests, identity, location and time MLBA offers the benefits of contextualization (Ho 2012). Thus, MLBA can be conducted precisely with a specific consumer target in mind, enabling greater communication between the market and consumer, leading to greater business opportunities. In the context of this research, two components of anticipated benefits will be used: (1) locatability, which covers aspects such as location and time, and (2) content relevance, which stems from users' profile.

According to Premazzi et al. (2010), consumers are more likely to relinquish some privacy in exchange for monetary rewards. Monetary rewards refer to currency or currency-equivalent rewards like coupons, discounts, and gift certificates (Lee et al. 2013). Indeed, Xie et al. (2006) posit that the most influential factor in the disclosure of information is some kind of monetary reward. This is an important idea because it suggests that through the application of

external factors a consumer may be influenced to disclose information they had previously wanted to keep private (Koohikamali, Gerhart, & Mousavizadeh 2015).

## Research Method

*Data collection and sample characteristics*

The conceptual model was tested via a standardised survey conducted over a two-week period. Since mobile technology is a globalised commodity utilised daily by a wide range of consumers, a convenience sample group was selected for this study. The survey was distributed electronically via e-mail and social networking sites including Facebook, Twitter and Instagram, to 823 potential participants. The authors also used digital marketing groups on LinkedIn: including Location-Based Services (LBS) Zone (858 members), and Location-Based Advertising (LBA) discussion group (789 members). These two groups, as well as the author's own connections, provided a potential population of 2,470 members who by default are likely comfortable with technology. The survey recorded 252 responses, all of which were usable for this investigation (i.e. fully completed questionnaires). This yielded an overall respond rate of 10.2%. Table 1 provides an overview of the demographic distributions the samples that includes 82% of respondents who are aware of MLBA and 62% who have already received this type of advertising.

| Age of responders | Female | Male |
|---|---|---|
| 24 and under | 18.65% | 9.13% |
| 25-34 | 23.02% | 14.68% |
| 35-44 | 8.33% | 6.75% |
| 45 and over | 9.92% | 9.52% |
| Total | 59.92% | 40.08% |

Table 1. Sample description.

*Survey development*

The survey was made up of thirty-nine questions, six of those questions are related to the demographics (gender, age, nationality) and participants' awareness of MLBA. The rest of the questions were designed to gauge acceptance of MLBA practices, using a 5-point Likert scale, ranging from 1 = 'strongly disagree' and 5 = 'strongly agree'. Each construct was represented by multiple scale items that were adapted from existing measures that had been validated in previous mobile advertising studies as summarised in Appendix 1.

## Data Analysis and Results

*Assessment of the Conceptual Model*

A principle component analysis (PCA) was conducted on the 33 items with orthogonal rotation using varimax method to test the validity of the constructs using SAS Enterprise Guide 5.1 software, see results in Appendix 2. Sample adequacy for the analysis was conducted through Kaiser-Mayer-Olkin (KMO) test. The result shown in KMO = 0.892, which sits between 0.8 and 0.9 indicates a "great" value of sampling adequacy according to Field and Miles (2010), and all

KMO values for individual items were > .77, exceeding the suggested threshold value of 0.5 (Field & Miles 2010).

Given the sample size and the theoretical dimensions proposed in Fig. 1, eleven components were retained with acceptable eigenvalues of .7 that in combination explained 81.30 percent of the variance. The results in Appendix 2 confirmed that all items were significantly loaded on the respective constructs and therefore validity for the dimensions proposed in Fig. 1 was established (Hair et al. 2006).

Additionally, Cronbach's α score results were used to assess the constructs reliability and it can be observed in Table 2 that all of the coefficients are greater than 0.83, showing high reliability among the items for all dimensions (Bagozzi & Yi 1988 cited in Sultan, Rohm & Gao 2009).

Table 2
Cronbach's α score for each dimension of the theoretical model

| Subscale | Factors | Factor code | Items | Cronbach's α score |
|---|---|---|---|---|
| 1 | IPC | IPC | col1, col2, col3, imp1, imp2, imp3, sec1, sec2, sec3, err1, err2, err3, awa1, awa2, awa3, con1, con2, con3 | 0.92 |
| 2 | Intrusiveness | INT | int1, int2, int3 | 0.83 |
| 3 | Personalization | PER | cre1, cre2, cre3, loc1, loc2, loc3 | 0.86 |
| 4 | Monetary Rewards | MON | mon1 mon2 mon3 | 0.90 |

**Discussion and Implications**

The findings of this research extend the current literature by evaluating the role of four antecedent dimensions —IPC, intrusiveness, personalising and monetary rewards— related to users' acceptance of MLBA. Overall, this paper contribute to provide an integrated model to evaluate the key risks and benefits of MLBA.

The data of this study confirms that MLBA is an innovative form of advertising that is rapidly growing since 82% of the sample respondents are aware of it and 62% has already received this type of advertising. The results also showed that there are different acceptance levels, and this highlights the importance of understanding the factors that influence consumers' acceptance towards MLBA.

This study builds on the work of existing research (Keith et al. 2013; Sun et al. 2015; Xu et al. 2011) that looks at the impact of perceived risk and perceived benefit on acceptance intentions. Prior research has confirmed that personalization and individuals' IPC are important determinants of MLBA (Aguirre et al. 2015; Eastin et al. 2015; Sutano et al. 2013; Xu et al. 2011), however, the findings of this research reveal that monetary rewards is a stronger predictor. Therefore, this study advances the understanding of the privacy calculus perspective by providing a more comprehensive view of the key risk and benefit components that marketers should consider (i.e. intrusiveness, IPC, personalization and monetary rewards) in order to develop

successful mobile advertising.

## Conclusion

This study aimed to determine the dimensions which influence the acceptance of MLBA. The conceptual model for MLBA acceptance, based on the privacy calculus perspective, was broken down and investigated to determine what the most important benefits and risks were with regards to MLBA acceptance. These factors were drawn and selected from multiple past research studies in involving IPC, intrusiveness, personalization, and monetary rewards. Although further research is needed to achieve a more universal and comprehensive understanding of what the key determinants for MLBA, this research revealed monetary rewards as the stronger factor for acceptance of MLBA. However, further analysis is required in the next stage of this research to find out the predictable power of the proposed model.

**References**


Andrews, Michelle, Jody Goehring, Sam Hui, Joseph Pancras, & Lance Thornswook (2016), "Mobile Promotions: A Framework and Research Priorities," *Journal of Interactive Marketing,* 34, 15-24.

Baek, Tea H. & Mariko Morimoto (2012), "Stay Away from Me," *Journal of Advertising*, 41, 1, 59-76.

Beldad, Ardion, & Margareta Citra Kusumadewi (2015), "Here's my Location, for Your Information: The Impact of Trust, Benefits, and Social Influence on Location Sharing Application Use Among Indonesian University Students," *Computers in Human Behavior*, 49, 102-110.

Chaffey, Dave, & Fiona E. Chadwick (2012), "Digital Marketing: Strategy, Implementation and Practice," *Pearson Education Limited,* 5th Edition, 142-145.

Davies, Simon G. (1997), "Re-engineering the Right to Privacy: How Privacy Has Been Transformed from a Right to a Commodity," *Technology and Privacy: The New Landscape*. MIT Press.

Dinev, Tamara & Paul Hart (2006), "An Extended Privacy Calculus Model for E-Commerce Transactions," *Information Systems Research,* 17, 1, 61-80.

Dinev, T., Heng Xu, Jeff H. Smith, & Paul Hart (2013), "Information Privacy and Correlates: An Empirical Attempt to Bridge and Distinguish Privacy-Related Concepts," *European Journal of Information Systems*, 22, 3, 295–316.

Eastin, Matthew S., Nancy H. Brinson, Alexandra Doorey, & Gary Wilcox (2016), "Full Length Article: Living in a Big Data World: Predicting Mobile Commerce Activity through Privacy Concerns," *Computers in Human Behavior,* 58, 214-220.

Edwards, Steven M., Hairong Li, & Joo-Hyun Lee (2002), "Forced Exposure and Psychological Reactance: Antecedents and Consequences of the Perceived Intrusiveness of Pop-Up Ads", *Journal of Advertising*, 31, 3, 83-95.

eMarketer (2016), "Top Mobile Advertisers, 2015-2016." Market Share Report. Ed. Robert S. Lazich. 2016 ed. Farmington Hills, MI: Gale, 2016. Business Insights: Global. Web. 24 Oct. 2016.

Featherman, Mauricio S., & Paul A. Pavlou (2003), "Predicting E-Services Adoption: A Perceived Risk Facets Perspective," International Journal of Human-Computer Studies, 59 (4) (2003), pp. 451–474.

Field, Andy, & Jeremy Miles (2010), "Discovering Statistics Using SAS," SAGE Publications Ltd, 541-589.

Geetha, V., & Kalyani Rangarajan (2015) "A Conceptual Framework for Perceived Risk in Consumer Online Shopping," *Global Management Review,* 10, 1, 9-22.

Hair, Joseph F., William C. Black, Barry J. Babin, & Rolph E. Anderson (2006), "Multivariate Data Analysis," *Pearson's Education Inc*, NJ.

Hann, Il-Horn, Hui Kai-Lung, Lee Sang-Yong Tom, & Ivan P. L. Png (2007), "Overcoming Online Information Privacy Concerns: An Information-Processing Theory Approach," *Journal of Management Information Systems* 24, 2, 13-42.

Hong, Weiyin & James Y.L. Thong (2013), "Internet Privacy Concerns: An Integrated Conceptualization and Four Empirical Studies," *MIS Quarterly*. 37, 1, 275-298.

Jentzsch, Nicola, Soren Preibusch, Andreas Harasser (2012), "Study on Monetising Privacy: An Economic Model for Pricing Personal Information," *European Network and Information Security Agency (ENISA)*, Published, 1–76.

Keith, Mark J., Jeffrey S. Babb, Christopher P. Furner, & Amjad Abdullat (2010), "Privacy Assurance and Network Effects in the Adoption of Location-based Services: An iPhone Experiment," *International Conference on Information Systems (ICIS '10)*, 1,1, 237.

Keith, Mark J, Samuel C. Thompson, Joanne Hale, Paul B. Lowry, & Chapman Greer (2013), "Information Disclosure on Mobile Devices: Re-examining Privacy Calculus with Actual User Behavior," *International Journal of* Human - Computer Studies, 71, 1163-1173.

Kim, Dan J. (2008), "Self-Perception-Based Versus Transference-Based Trust Determinants in Computer-Mediated Transactions: A Cross-Cultural Comparison Study," *Journal of Management Information Systems*, 24, 4, 13–45.

Kim Yoo J. & JinYoung Han (2014), "Why Smartphone Advertising Attracts Customers: A Model of Web Advertising, Flow, and Personalization," *Computers in Human Behaviour,* 33, 256-269.

Koohikamali, Mehrdad, Natalie Gerhart, & Mohammadreza Mousavizadeh (2015), "Location Disclosure on LB-SNAs: The Role of Incentives on Sharing Behavior," *Decision Support Systems*, 71, 78-87.

Lee, Haein, Hyejin Park, & Jinwoo Kim (2013), "Why Do People Share their Context Information on Social Network Services? A Qualitative Study and an Experimental Study on Users' Behavior of Balancing Perceived Benefit and Risk," *International Journal of Human - Computer Studies* 71, Social Networks and Ubiquitous Interactions, 862-877.

Li, Han, Ratindar Sarathy, & Heng Xu (2011), "The Role of Affect and Cognition on Online Consumers' Decision to Disclose Personal Information to Unfamiliar Online Vendors," *Decision Support Systems*, 51, 3, 434–445.

Limpf, Nina & Hilde A.M. Voorveld (2015), "Mobile Location-Based Advertising: How Information Privacy Concerns Influence Consumers' Attitude and Acceptance," *Journal of Interactive Advertising*, 15, 2, 111-123.

Malhotra, Naresh K., Kim Sung S., and James Agarwal (2004), "Internet Users'

Information Privacy Concerns (IUIPC): The Construct, the Scale, and a Causal Model," *Information Systems Research,* 15, 4, 336–355.

Okazaki, Shintaro (2004), "How Do Japanese Consumers Perceive Wireless Ads? A Multivariate Analysis," *International Journal of Advertising*, 23, 4, 429–54.

Okazaki, Shintaro, Hairong Li, & Morikazu Hirose (2009), "Consumers Privacy Concerns and Preferences for Degree of Regulatory Control", *Journal of Advertising,* 38, 4, 36-77.

Park, Daniel Y., & Elizabeth M. Goering (2016), "The Health-Related Uses and Gratifications of YouTube: Motive, Cognitive Involvement, Online Activity, and Sense of Empowerment," *Journal of Consumer Health On the Internet*, 20, 1/2, 52.

Park, Taezoon, Rashmi Shenoy, & Gavriel Salvendy (2008), "Effective Advertising on Mobile Phones: A literature Review and Presentation of Results from 53 Case Studies," *Behaviour and Information Technology*, 27, 5, 355-73.

Premazzi, Katia, Sandro Castaldo, Monica Grosso, Pushkala Raman, Susan Brudvig, & Charles F. Hofacker (2010), "Customer Information Sharing with E-Vendors: The Roles of Incentives and Trust," *International Journal of Electronic Commerce*, 14, 3, 63-91.

Rau, Pei-Luen P., Ting Zhang, Xiaoli Shang, & Jia Zhou (2011), "Content Relevance and Delivery Time of SMS Advertising", *International Journal of Mobile Communications,* 9, 1, 19-38.

Shankar, Venkatesh, & Edward C. Malthouse (2007), "Moving Interactive Marketing Forward," *Journal of Interactive Markering,* 20, 1, 2.

Smith, H. Jeff, Tamara Dinev, & Heng Xu (2011), "Information Privacy Research: An Interdisciplinary Review," *MIS Quarterly*, 35, 989–1015.

Sultan, Fareena, Andrew J. Rohm, & Tao Gao (2009), "Factors Influencing Consumer Acceptance of Mobile Marketing: A Two-Country Study of Youth Markets," *Journal of Interactive Marketing*, 23, 208-320.

Sun, Yongqiang, Nan Wang, Xiao-Liang Shen, & Jacky X. Zhang (2015), "Location Information Disclosure in Location-Based Social Network Services: Privacy Calculus, Benefit Structure, and Gender Differences," *Computers in Human Behavior*, 52, 278-292.

Sutanto, Juliana, Elia Palme, Chuan-Hoo Tan, & Chee W. Pang (2013), "Addressing the Personalization-Privacy Paradox: An Empirical Assessment form a Field Experiment on Smartphone Users," *MIS Quarterly*, 37, 4, 1141-1164.

Truong, Yann & Geoff Simmons (2010), "Perceived Intrusiveness in Digital Advertising: Strategic Marketing Implications," *Journal of Strategic Marketing*, 18, 3, 239-256.

Ünal, Sevtap, Aysel Ercis, & Ercan Keser (2011), "Attitudes towards Mobile Advertising

– A Research to Determine the Differences between the Attitudes of Youth and Adults," *Social and Behavioral Science*, 24, 361-377.

Unni, Ramaprasad & Robert Harmon (2007), "Perceived Effectiveness of Push vs. Pull Mobile Location- Based Advertising," *Journal of Interactive Advertising, 7,* 2, 1-24.

Varnali, Kaan (2012), "SMS Advertising: How Message Relevance is Linked to the Attitude Toward the Brand?," *Journal of Marketing Communications*, 1, 1, 1-13.

Ward, Steven, Kate Bridges, & Bill Chitty (2005), "Do Incentives Matter? An Examination of On-line Privacy Concerns and Willingness to Provide Personal and Financial Information," *Journal of Marketing Communications,* 11, 1, 21-40.

Wehmeyer, Kai (2007), "Mobile Ad Intrusiveness – The Effects of Message Type and Situation" *eMergence: Merging and Emerging Technologies Processes, and Institutions*, 6, 1, 1-18.

Xie, En, Hock-Hai Teo, & Wen Wan (2006), "Volunteering Personal Information on the Internet: Effects of Reputation, Privacy Notices, and Rewards on Online Consumer Behavior," *Marketing Letters*, 17, 1, 61–74.

Xu, David J., Stephen S. Liao, & Qiudan Li (2008), "Combining Empirical Experimentation and Modeling Techniques: A Design Research Approach for Personalized Mobile Advertising Applications," *Decision Support Systems,* 44, 3, 710-724.

Zhao, Ling, Yaobin Lu, & Sumeet Gupta (2012), "Disclosure Intention of Location-Related Information in Location-Based Social Network Services," *International Journal of Electronic Commerce,* 16, 4, 53-90.

Appendix 1. Constructs items

| Construct | Item | References |
|---|---|---|
| *Perceived Intrusiveness* | INT1. I feel that mobile location-based advertising is irritating.<br>INT2. I feel that mobile location-based advertising is interfering.<br>INT3. I feel mobile location-based advertising is too annoying. | Kim & Han (2014) |
| *Data Collection* | COL1. It bothers me when companies track my location through my mobile phone.<br>COL2. When companies ask to track my location through my mobile phone, I think twice before allowing this information.<br>COL3. I am concerned that companies are collecting too much location information about me through my mobile phone. | Hong & Thong (2013) |
| *Secondary Usage of Data* | SEC1. I am concerned that when I authorise companies to track my location, they will also use my location for other purposes.<br>SEC2. I am concerned that companies could share my tracked location with others.<br>SEC3. I am concerned that companies could sell my tracked location to others. | |
| *Improper Access of Data* | IMP1. I am concerned that my location collected through my mobile phone can be easily accessed by unauthorised parties.<br>IMP2. I am concerned that companies do not maintain enough control over my mobile location information.<br>IMP3. I am concerned that companies do not devote enough effort to preventing unauthorised access to my mobile location data. | |
| *Control of Data* | CON1. It bothers me if companies collect my mobile location and I cannot alter the location settings.<br>CON2. It bothers me when I do not have control over how my mobile location is used by companies.<br>CON3. I am concerned when companies reduce my control over my mobile location information. | |
| *Awareness of Data Usage* | AWA1. I am concerned when clear and transparent information is not included in the privacy policies of companies tracking my mobile location.<br>AWA2. It bothers me when I am not sure how my location will be used by companies tracking my mobile location. | |

| | | |
|---|---|---|
| | AWA3. It bothers me when companies seeking my mobile location do not disclose how this information will be used. | |
| *Error* | ERR1: Companies should take more steps to make sure that the personal information in their files is accurate. | |
| | ERR2: Companies should have better procedures to correct errors in personal information. | |
| | ERR3: Companies should devote more time and effort to verifying the accuracy of the personal information in their databases. | |
| *Content Relevance* | CRE1: I feel that mobile location-based advertisement can provide me with the kind of ads I might like. | Xu et al. (2009) |
| | CRE2. It is important that mobile advertisements have relevant information tailored to my personal interests. | Xu et al. (2009)<br>Lee & Rha (2015) |
| | CRE3. I feel that mobile location-based advertisement would tailor to my needs. | |
| *Locatability* | LOC1. Is important that mobile location-based advertisements give me access to relevant information at the right place. | Xu et al. (2014) |
| | LOC2. Is important that mobile location-based advertisements give me up-to-date information. | Xu et al. (2009)<br>Kim & Han (2014) |
| | LOC3. It is important that mobile location-based advertising is delivered in a timely way. | |
| *Monetary rewards* | ENG1. I am satisfied to get mobile location-based advertising that includes offers or rewards. | Adapted Ünal, Ercis, & Keser (2011) |
| | ENG2. I am more inclined to accept mobile location-based advertising if it includes offers or rewards that I might like. | |
| | ENG3. I will pay attention to mobile location-based advertising if I get an acceptable offer or reward. | |

Appendix 2. Principal component analysis for the MLBA questionnaire (N=252)

| item | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6 | Factor 7 | Factor 8 | Factor 9 | Factor 10 | Factor 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **MON1** | **0.84** | -0.09 | 0.02 | 0.18 | 0.02 | -0.03 | 0.19 | 0.23 | -0.07 | -0.04 | 0.01 |
| **MON3** | **0.83** | -0.07 | -0.01 | 0.14 | -0.01 | 0.00 | 0.27 | 0.11 | -0.13 | -0.01 | -0.06 |
| **MON2** | **0.82** | -0.05 | 0.02 | 0.19 | 0.03 | 0.06 | 0.15 | 0.25 | -0.12 | -0.09 | -0.12 |
| **SEC3** | -0.04 | **0.84** | 0.16 | -0.05 | 0.16 | 0.15 | -0.06 | -0.04 | 0.11 | 0.07 | 0.25 |
| **SEC2** | -0.08 | **0.83** | 0.13 | -0.05 | 0.24 | 0.20 | -0.07 | -0.04 | 0.06 | 0.11 | 0.22 |
| **SEC1** | -0.11 | **0.77** | 0.07 | 0.00 | 0.13 | 0.22 | -0.07 | -0.11 | 0.04 | 0.22 | 0.21 |
| **ERR2** | 0.02 | 0.13 | **0.92** | 0.03 | 0.07 | 0.07 | -0.06 | 0.03 | -0.02 | 0.08 | 0.10 |
| **ERR3** | 0.02 | 0.09 | **0.91** | 0.06 | 0.09 | 0.07 | -0.06 | 0.07 | 0.00 | 0.08 | 0.15 |
| **ERR1** | -0.03 | 0.09 | **0.90** | 0.00 | 0.15 | 0.08 | -0.05 | -0.01 | 0.01 | 0.07 | 0.14 |
| **CRE1** | 0.13 | -0.05 | 0.02 | **0.88** | 0.05 | -0.01 | 0.15 | 0.10 | -0.16 | -0.04 | 0.01 |
| **CRE3** | 0.16 | 0.03 | 0.03 | **0.87** | 0.00 | -0.02 | 0.18 | 0.16 | -0.04 | -0.09 | 0.00 |
| **CRE2** | 0.23 | -0.05 | 0.06 | **0.79** | -0.05 | 0.02 | 0.10 | 0.30 | -0.09 | 0.00 | -0.07 |
| **AWA1** | 0.09 | 0.14 | 0.11 | -0.02 | **0.79** | 0.20 | -0.13 | 0.03 | 0.00 | 0.01 | 0.19 |
| **AWA2** | -0.01 | 0.20 | 0.12 | 0.06 | **0.78** | 0.15 | -0.06 | -0.03 | 0.12 | 0.22 | 0.19 |
| **AWA3** | -0.05 | 0.23 | 0.16 | -0.01 | **0.71** | 0.25 | 0.09 | 0.05 | 0.16 | 0.26 | 0.07 |
| **CON1** | 0.00 | 0.10 | 0.16 | 0.08 | 0.07 | **0.87** | 0.02 | -0.01 | 0.08 | 0.06 | 0.07 |
| **CON3** | 0.04 | 0.32 | 0.03 | -0.05 | 0.29 | **0.75** | -0.06 | -0.04 | 0.08 | 0.13 | 0.15 |
| **CON2** | 0.01 | 0.24 | 0.05 | -0.08 | 0.34 | **0.74** | -0.10 | -0.01 | 0.09 | 0.18 | 0.16 |
| **ACC1** | 0.33 | -0.12 | -0.08 | 0.24 | -0.04 | -0.06 | **0.75** | 0.15 | -0.25 | -0.11 | -0.01 |
| **ACC2** | 0.35 | -0.15 | -0.07 | 0.20 | -0.09 | -0.03 | **0.70** | 0.19 | -0.29 | -0.14 | -0.01 |
| **ACC3** | 0.43 | 0.01 | -0.13 | 0.22 | -0.04 | -0.01 | **0.63** | 0.10 | -0.11 | -0.25 | -0.06 |
| **LOC2** | 0.25 | -0.13 | 0.13 | 0.20 | -0.04 | -0.04 | -0.05 | **0.79** | -0.26 | -0.06 | 0.01 |
| **LOC1** | 0.26 | -0.10 | 0.02 | 0.23 | -0.03 | -0.01 | 0.15 | **0.77** | -0.19 | -0.03 | 0.03 |
| **LOC3** | 0.18 | 0.04 | -0.03 | 0.20 | 0.12 | 0.00 | 0.32 | **0.74** | 0.04 | -0.08 | -0.18 |
| **INT2** | -0.09 | 0.08 | -0.10 | -0.07 | 0.10 | 0.13 | -0.06 | -0.16 | **0.83** | 0.21 | 0.04 |
| **INT1** | -0.23 | 0.06 | 0.09 | -0.18 | 0.09 | 0.08 | -0.37 | -0.14 | **0.70** | 0.10 | 0.06 |
| **INT3** | -0.14 | 0.08 | 0.05 | -0.19 | 0.11 | 0.08 | -0.42 | -0.14 | **0.61** | 0.25 | 0.19 |
| **COL2** | -0.16 | 0.18 | 0.04 | -0.08 | 0.21 | 0.25 | -0.03 | 0.01 | 0.23 | **0.74** | -0.08 |
| **COL3** | 0.04 | 0.26 | 0.13 | -0.01 | 0.16 | 0.11 | -0.28 | -0.10 | 0.10 | **0.70** | 0.29 |
| **COL1** | -0.08 | 0.08 | 0.22 | -0.11 | 0.16 | 0.05 | -0.22 | -0.13 | 0.23 | **0.69** | 0.28 |
| **IMP2** | -0.09 | 0.34 | 0.24 | -0.05 | 0.24 | 0.19 | 0.00 | -0.03 | 0.10 | 0.10 | **0.73** |
| **IMP3** | -0.04 | 0.35 | 0.20 | -0.08 | 0.20 | 0.14 | -0.01 | -0.07 | 0.17 | 0.13 | **0.69** |
| **IMP1** | -0.10 | 0.40 | 0.21 | 0.07 | 0.22 | 0.13 | -0.09 | -0.04 | -0.05 | 0.18 | **0.65** |
| **Eigen values** | **10.09** | **5.62** | **2.30** | **1.75** | **1.47** | **1.22** | **1.12** | **0.97** | **0.85** | **0.74** | **0.69** |
| **Variance explained** | **2.92** | **2.90** | **2.90** | **2.66** | **2.39** | **2.32** | **2.31** | **2.21** | **2.12** | **2.06** | **2.03** |