



**Repositorio Institucional de la Universidad Autónoma de Madrid**

<https://repositorio.uam.es>

Esta es la **versión de autor** del artículo publicado en:

This is an **author produced version** of a paper published in:

International Journal of Electronic Commerce 16.4 (2012): 91-119

**DOI:** <http://dx.doi.org/10.2753/JEC1086-4415160404>

© 2012 M.E. Sharpe, Inc. All rights reserved.

El acceso a la versión del editor puede requerir la suscripción del recurso  
Access to the published version may require subscription

# Privacy Concerns in Quick Response Code Mobile Promotion: The Role of Social Anxiety and Situational Involvement

*Shintaro Okazaki, María Ángeles Navarro-Bailón, and  
Francisco-Jose Molina-Castillo*

**ABSTRACT:** Drawing upon utility maximization theory, this study examines the consequences of quick response (QR) code mobile promotion in terms of information privacy concerns, defensive responses (intention to protect, fabricate, or withhold), and loyalty. Two contextual variables, social anxiety and situational involvement, are hypothesized as moderators. The main survey employs the scenario method with 667 general consumers in Japan. The results indicate that most of the main effects are supported for both moderators. There are strong interaction effects of social anxiety and situational involvement in intention to protect and intention to fabricate personal information. Our study suggests that QR code promotion is a practical and useful tool for loyalty, and its use may significantly depend on its context, whether physical or psychological.

**KEY WORDS AND PHRASES:** Internet, involvement, loyalty program, mobile device, promotion, QR code, social anxiety.

With the proliferation of BlackBerry, iPhone, and Android phones in the past few years, mobile handsets have gained a new name: smartphone. Smartphones offer enhanced usability, enabling users to enjoy seamless Internet services. Its sophisticated, multifunction touch screen keyboard replaces a tiny keyboard, which had proved a major obstacle to mobile commerce (m-commerce) adoption. As a result, services—including voice search, SNSs (social networking sites), GPSs (global positioning systems), and other downloadable applications—are becoming truly ubiquitous because they are accessible to users regardless of their physical location and time constraints. As of February 2011, the number of downloads from iPhone's App Store exceeded 10 billion [3]. Consequently, there is a growing expectation that m-commerce is finally on its way to becoming a reality, after being a "hot topic" for a decade [36].

Despite this optimism, however, experts see clouds on the horizon. According to a recent survey [29], approximately 70 percent of all SMS (short message service) spam is related to attempted financial fraud. Mistakenly replying to this spam may lead to phishing<sup>1</sup> or to premium rate fraud.<sup>2</sup> Some attacks employ click fraud related to gambling sites, followed by fraudulent loan services [55]. Of even greater concern is "bluesnarfing," in which calls can be hijacked, personal data can be stolen, and other violations can take place [52]. In short, there are an increasing number of unethical practices via mobile telecommunication systems. Deceptive invitations have become

a serious social issue because they attempt to steal important financial data, including credit card or bank account numbers. These problems seem to stem mainly from the unauthorized use of highly sensitive personal information. Unlike the personal computer, the wireless Internet and mobile communication networks make it extremely difficult to trace a sender's identity. Hence, rapid advances in mobile communication technology are an ironic cause of consumers' concerns regarding personal information abuse.

Unlike the case for e-commerce, empirical evidence on the effects of information privacy concerns in m-commerce has been scarce. So far, research in this area has mainly been in the context of opt-in and opt-out systems, which are associated primarily with message-based promotions. Barwise and Strong [6], Rettie et al. [43], and Tsang et al. [54] investigated consumers' acceptance of permission-based advertising in the form of SMS messages: Unexpected messages sent to consumers are likely to annoy the recipients and appear to be spam. However, recent evidence indicates that opt-in is no longer sufficient because a permission system alone cannot ensure consumers' confidence. For example, subscribers who opted in to e-mail newsletters may be reluctant to provide their personal information because the subscription mechanism may not be perceived as a sufficient safeguard. In this context, Okazaki et al. [37] examined consumers' preferences on the desired strictness of advertising regulation in mobile advertising delivered by e-mail newsletters. Their findings suggest that information privacy concerns substantially attenuate trust and strengthen the risk in mobile advertising, which in turn acts as a direct predictor of preference for regulatory strictness.

However, further consequences of information privacy concerns in m-commerce have not yet been explored. Our study is designed to fill this gap, with the general purpose of examining the effectiveness of quick response (QR hereafter) code mobile promotion. QR code is a unique barcode technology in which textual and visual information can be encoded. Users can scan the code to access a diverse range of integrated campaigns. According to Mobio Identity Systems [41], in North America QR code scanning grew by an astonishing 1,200 percent from July to December 2010. Specifically, our research attempts to respond to the following questions:

- How would inactive clients react when they see a QR code campaign that promotes a loyalty program with an immediate incentive?
- What if they are asked to disclose their personal data to become a loyalty program member?
- What type of contextual variables would influence such behavior?

Drawing upon utility maximization theory, our study attempts to examine the factors influencing the adoption of QR code mobile promotion. We expect to advance the current understanding of m-commerce by addressing several underlying issues. This paper makes three specific contributions to the literature:

1. This paper empirically further examines the consequences of information privacy concerns in mobile promotion from a new perspec-

tive. While many voices are heard on concerns about threats to their information privacy, the bulk of previous research still examines permission-based advertising. This paper provides new insights on QR code mobile promotion, which is considered one of the most innovative mobile marketing techniques.

2. Although the QR code has received much attention from practitioners, academic research from consumer perspectives is extremely scarce. This study adds to our understanding of how people perceive the QR code, and why they do or do not accept this type of mobile promotion in terms of information privacy concerns, balancing operations, and loyalty.
3. This paper sheds light on one of the important contextual variables in m-commerce: social anxiety. Research that examines social anxiety in m-commerce is almost nonexistent, and only one study has used this variable in self-service adoption [13]. Due to the ubiquitous nature of mobile handsets, the situational or contextual variables are of extreme importance, and thus deserve special attention.

In what follows, we first describe QR code mobile promotion and discuss our key concerns regarding its acceptance. We then explain the independent and dependent variables, followed by our hypotheses. Next, we explain the methodology in detail. The analysis and results are presented, followed by a discussion of the results and their managerial implications. We conclude the paper with directions for future research and a discussion of important limitations.

## **QR Code Mobile Promotion**

In the past, a barcode was a fast, easy, accurate, and automatic product-tracking method in industrial production and retailing. More generally, the unidimensional (1D) barcode, bidimensional (2D) image code, and color-based image code have all become popular, following the introduction of camera and scanning functions in mobile devices. In general, these codes are easily machine readable via the built-in camera in mobile devices. By scanning or taking a picture, users can easily access various services. The image codes or image recognition-based codes, which include PDF-417, QR codes, and Data Matrix represent a large amount of data, because they have higher density than the 1D barcodes. In comparison with 1D barcodes, most 2D image codes encode high-density data to represent a larger amount of data in a smaller size, but 2D image codes have more complex code structures.

The most representative 2D image code in terms of mobile Internet service is the QR code. The QR code possesses three finder patterns for finding the code area, two format information patterns for indicating the data masking method used, and error correction level information; two versions of information patterns to establish the numbers of the row and column patterns of the code; two timing patterns and alignment patterns for aligning the code patterns; data code word patterns for encoding the code value; and error cor-

rection code word patterns to correct errors in the decoded data. The barcode recognition process has five steps: (1) edge detection, (2) shape detection, (3) identification of the barcode control bar, (4) identification of the barcode orientation, dimensions, and bit density using the control bar, and (5) calculation of the barcode value.

This error correction capability enables data to be restored, even if the symbol is partially dirty or damaged. Furthermore, the designed QR code can be recognized by including design elements, such as a game character image or a company logo, and can then be included in the area containing the code word patterns. In case of an error, the mobile device obtains an erroneous code value because the design elements generate wrong patterns, but the decoder can rectify the value by using the error-correction algorithm. However, the design elements must be within the code word-pattern area because other pattern areas, such as alignment patterns, finder patterns, or timing patterns, have little or no error correction information. Conventional barcodes are capable of storing a maximum of approximately 20 digits, but the QR code is capable of handling much more information, including numeric, alphabetic, and Asian characters (such as kanji, kana, and hiragana), symbols, binary characters, and control codes. Up to 7,089 numeric, 4,296 alphanumeric, and 1,817 kanji characters can be encoded in one symbol.

According to a 2008 survey in Japan [53], the most frequently used media for QR codes were magazines (23.6 percent), PC Internet (20.6 percent), inserts (20.0 percent), packages (14.4 percent), newspapers (8.9 percent), receipts (6.5 percent), outdoor advertising (2.7 percent), and business cards (2.0 percent). The most popular sources of information accessed were coupons (41.1 percent), campaign sites (39.9 percent), map or traffic information (11.3 percent), and music or video (6.1 percent). In terms of access frequency, there were clear differences in terms of gender and age. Females (12.2 percent) outweighed males (7.6 percent) in scanned QR code use. Younger consumers in their twenties were more active users (18.1 percent), followed by those in their thirties (12.5 percent) and users in their forties (10.0 percent).

## **Utility Maximization Theory**

Utility maximization theory posits that consumers tend to weigh the trade-off involved between their decision to offer personal data and the potential negative consequences of doing so [46]. Despite the difficulty of clearly distinguishing the values of one social exchange from another, this theory has been applied in online privacy calculus, in which it measures the negative effects of concerns over disseminating personal information against the consumer-rated importance of information transparency; this in turn affects consumers' willingness to participate in online profiling [4]. Utility maximization has been applied to consumer privacy in previous research to examine the market for privacy [46]. On this basis, our research extends the research on Internet information privacy concerns [10, 14, 28, 37, 39] by adding two additional constructs: defensive responses and loyalty.

## ***Information Privacy Concerns***

Information privacy involves an individual's control over the acquisition, disclosure, and use of personal information [23]. Lwin et al. [27] found that information privacy concerns influence customers' apprehension and uneasiness over the use of their personal data, which ultimately controls their resultant defensive responses. In the light of utility maximization theory, information privacy in m-commerce has become a prominent concern because ubiquitous multimedia capacity enables firms to collect significant amounts of personal information and to store it indefinitely for later use [37].

This is ironic because one of the benefits in using a "phone" as a marketing device is its ability to use consumer information to attempt to offer personalized service, which will increase value and, consequently, consumer loyalty. In this light, Awad and Krishnan [4] examined the relationship between information transparency features and consumer willingness to partake in personalization. Information transparency features are "features that give consumers access to the information a firm has collected about them, and to how that information is going to be used" [4, p. 14]. To their surprise, they found that those consumers who value information transparency features are actually less willing to be profiled online for personalized services and advertising. In addition, the perceived benefit of personalization affects the importance of previous privacy invasion on that very willingness.

## ***Defensive Responses***

Lwin et al. [27] proposed three possible outcomes of defensive responses to information privacy concerns: the fabrication of personal information ("fabricate"), adoption of protective measures ("protect"), or refusal to transact with a Web site ("withhold"). These defensive responses are the consequence of a perceived imbalance in the power-dependence relationship. For example, if smartphone users perceive that mobile marketers are acting responsibly and thus respecting privacy policies and that sufficient legal regulations are in vigor and in practice, then these users are expected to show less concern for potential privacy violation, and therefore not resort to balancing operations. But if those in power positions are not perceived as acting responsibly, consumer concern is likely to intensify, leading to defensive measures [27]. These responses are consistent with utility maximization theory in that consumers will make specific trade-offs in the online setting to minimize foreseeable losses (e.g., [38]).

Intention to fabricate could affect firms' databases if consumers are willing to register fictitious or false information. In fact, the number of fake identities has increased in recent years, and this increases firms' costs substantially [33]. Intention to protect would be the most positive consequence, since consumers are willing to be involved in a QR code promotion while attempting to take necessary precautions. This may or may not be possible, depending on the existence and availability of protective tools. By contrast, intention to withhold is

a complete refusal to respond to any campaign effort. This is perhaps the most negative consequence, since no relationship will then result from the QR code promotion. From the utility maximization theory perspective, the intention to fabricate or to protect personal data can be regarded as a possible behavioral consequence because consumers' ultimate goal is to maximize personal economics; intention to withhold is a total rejection of the promotion.

## ***Loyalty***

Prior research indicates that consumer loyalty toward the service provider is directly affected by consumers' perceived benefit [50]. In terms of utility maximization theory, loyalty can be thought of as an ultimate outcome of firms' value creation [4]. From the several definitions of loyalty in the marketing literature, this study adopts the psychological meaning of loyalty: a diverse set of signaling behavioral intentions that are indicative of a motivation to maintain a relationship with the focal firm. This definition also seems to be in accord with utility maximization theory, since the ultimate benefit of loyalty is explicit as well as implicit value creation, resulting from, for example, allocating a higher share of the category wallet to the specific service provider, engaging in positive word of mouth (WOM), and making repeat purchases [57].

The enhanced ability to collect, analyze, and respond to user information allows firms to personalize services, thus increasing value and, consequently, consumer loyalty [4]. It has been argued that satisfied and dissatisfied customers perceive reward program loyalty in different ways, and further study is needed to verify this relationship [15]. In this study, we posit that, after determining their behavioral intentions to fabricate, ignore, or respond to mobile promotion, consumers would finally determine whether to repeat their purchase and/or engage in WOM. This is often the ultimate objective of any promotional effort, which is, after all, a tool of customer relationship management (CRM) programs.

## **Contextual Variables**

In this section, we provide a brief theoretical overview of the two additional constructs of interest as moderators: social anxiety and situational involvement.

### ***Social Anxiety***

The mobile device is known to be unique because of one of its most important features: ubiquity. Ubiquitous interactivity allows consumers to access the Internet at any time at any place. However, such spatial flexibility may make consumers more aware of the surrounding situation. For example, when we use the mobile device on a street, we tend to be more conscious of "public eyes," and thus more cautious about what information we should or should



not manage. Conscious attention can be directed outward, toward the environment, or inward, toward the self. Such a distinction between the levels of consciousness was introduced first by Mead [32] and later enriched by Duval and Wicklund [16]. In the case of outward consciousness, environmental settings are a major concern in our behavioral decisions. In this light, Belk [9] pointed out situations that are separate sources of influence on consumer behavior. More specifically, Belk defined a consumer situation as “all those factors particular to a time and place of observation” that are clearly alienated from personal (intra-individual) and stimulus (choice alternative) attributes [8, p. 158]. By the same token, mobile users’ behavior will depend on the type of situation or surroundings they face. Under a stressful or uncomfortable situation, they may feel uneasy or not inclined to access certain kinds of information with their mobile device.

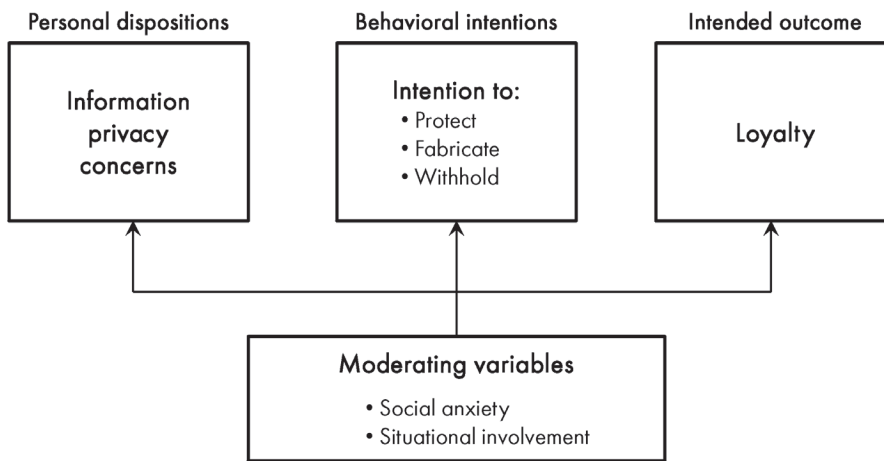
In this light, the literature in clinical psychology suggests that social anxiety affects human behavior. The term *social anxiety* is used herein to refer to a continuum of social fears ranging from social distress to shyness. Fenigstein et al. [17] defined social anxiety as the discomfort that is associated with the awareness of other people’s perspectives of oneself as a social object. Dabholkar and Bagozzi [13] argued that social anxiety can arise from situational circumstances, such as perceived crowding in a service queue line. Furthermore, prior research has indicated that, under a potentially socially threatening situation, socially anxious individuals may experience amplified negative emotional states as well as diminished positive emotional, cognitive, and intimacy-related outcomes [24]. Researchers have also found that people with high social anxiety respond to social evaluative situations with more self-focused attention than people with low social anxiety [20, 21]. Likewise, upon entering social situations, highly socially anxious individuals instantly direct their attention both inwardly, by focusing on negative self-appraisals and potential social failure, and outwardly, by vigilantly scanning their social world for cues of rejection, such as negative or ambiguous facial expressions [42].

### ***Situational Involvement***

Another important theoretical perspective is the level of situational involvement. Houston and Rothschild [22] distinguished two types of involvement: situational involvement and enduring involvement. Situational involvement refers to “temporary feelings of involvement that accompany a particular situation” [44, p. 143]. In other words, it relates to the ability of a particular situation to evoke individuals’ concerns for their behavior in that situation. By contrast, enduring involvement stems from an individual’s value system and prior experience with products, thus reflecting the relatively stable nature of a personality trait. Thus, enduring involvement is an individual difference variable representing the general long-run concern with a product that a consumer brings to a situation [11, 49].

This study concerns situational involvement in a mobile promotion, which is, by definition, transitory in nature. Prior research has indicated that the level of situational involvement declines when the ultimate goal is achieved. In mo-





**Figure 1. Conceptual Model**

bile promotion, the persuasive effect of a promotional campaign is expected to exist only in the short term, and the intensity of such an effect is expected to be more persistent for high versus low involvement [2, 56]. Furthermore, situational involvement associated with a purchasing decision is highly related to the type of product, where specific information is given and a cognitive search starts. In this regard, Beatty and Smith [7] found that purchase involvement, time availability, and product-class knowledge were the primary determinants of retailer search and media search. Of particular interest to our study, we believe that whether consumers decide to withhold or respond to a particular mobile promotion may depend on the value associated with a particular time and place, hence the level of situational involvement. For example, prior research on involvement seems to suggest that, when individuals are given the right information at the right place, they will seek out information via various marketing channels, including loyalty program promotion.

Figure 1 shows our conceptual model, which schematizes the relationships among our main variables of interest.

## Hypotheses

Dabholkar and Bagozzi argued that “there is emotion attached to social anxiety” [13, p. 190]. However, this emotional attachment is not attributable to self-consciousness, but rather to situational circumstances. Prior research on cognition and emotion has found that the experience of positive feelings informs an individual that his or her personal situation provides rewarding outcomes and poses no threats. When consumers are in a less stressful situation, because these individuals are comfortable and confident about their situation, they are less likely to engage in a detailed assessment of the events and stimuli in their environment. Thus, those consumers are inclined to assess the QR code in their environment through a passive and simple feeling or impression [35, 47]. People who feel good tend to provide positive judgments

about the code and access or scan it because they assume the environment ensures the safety of the retrievable content.

Psychologists generally agree on the cognitive conditions that give rise to different types of emotions. The belief that an event is negative, uncertain, and uncontrollable is associated with the emotion of anxiety or fear [45]. The experience of negative feelings informs an individual that his or her personal situation provides unrewarding outcomes and poses threats. Because these individuals are uncomfortable and uncertain about their situations, they are more likely to engage in a detailed assessment of the events and stimuli in their environment. When consumers are in a crowded and stressful location, they may feel psychologically unfocused and disturbed, and thus may hesitate to access the QR code. The reason for this is that social anxiety drives protective attitudes toward the potential invasion of encoded information (i.e., information from the marketer who created the code) aimed at personal information disclosure. The opposing power would be situational involvement, which is strongly associated with the degree of purchase occasion, object usage, irrevocability, and personal responsibility associated with the decision [2]. All things being equal, high situational involvement would require higher personal decision making, thus leading to greater apprehension over personal data transaction through, for example, QR codes. Our prediction is that, when accessing a QR code, those consumers who perceive both social anxiety and situational involvement have a much higher chance of feeling threatened about their personal information or privacy. This leads us to the following hypotheses:

***Hypothesis 1a:*** *High social anxiety will lead to greater information privacy concerns.*

***Hypothesis 1b:*** *High situational involvement will lead to greater information privacy concerns.*

***Hypothesis 1c:*** *As situational involvement increases, higher social anxiety will exhibit a more positive effect on information privacy concerns.*

When the level of information privacy concerns is high, utility maximization may be blocked, thus activating a defense mechanism in which consumers will not be motivated to further explore the QR code. In this case, even an attractive incentive is not persuasive, and consumers simply decide not to disclose their identity. However, when the situational involvement is high, consumers' behavior may be prompted either by protecting their personal data or by obtaining access with a false identity because the primary objective lies in the participation per se. Here, balancing operations will be activated, especially when privacy concerns are high and when there are significant benefits to consumers from registering their personal information [27]. We argue that when consumers pretend to optimize their utility under both high social anxiety and high situational involvement, they are more likely to resort to defensive behavior, such as fabricating or protecting their personal information, or simply withholding their participation. More formally:

**Hypothesis 2a:** High social anxiety will lead to greater intention to fabricate personal information.

**Hypothesis 2b:** High situational involvement will lead to greater intention to fabricate personal information.

**Hypothesis 2c:** As situational involvement increases, higher social anxiety will exhibit a more positive effect on intention to fabricate personal information.

**Hypothesis 3a:** High social anxiety will lead to greater intention to protect personal information.

**Hypothesis 3b:** High situational involvement will lead to greater intention to protect personal information.

**Hypothesis 3c:** As situational involvement increases, higher social anxiety will exhibit a more positive effect on intention to protect personal information.

**Hypothesis 4a:** High social anxiety will lead to greater intention to withhold personal information.

**Hypothesis 4b:** High situational involvement will lead to greater intention to withhold personal information.

**Hypothesis 4c:** As situational involvement increases, higher social anxiety will exhibit a more positive effect on intention to withhold personal information.

Finally, the propensity to try to protect or fabricate one's own identity is a reflection of a decreased willingness to partake in firms' online data collection, although it is also an understandable defense against the potential abuse of one's personal information. By the same token, the propensity to reject providing information to a mobile promotion would be an ultimate rejection when the concerned individuals are faced with a perceived power-responsibility imbalance [27]. Such behavioral intentions are unlikely to nourish a relationship into a mature long-term exchange relationship, especially when both social anxiety and situational involvement are high. From the utility maximization perspective, and consistent with previous hypotheses, consumers are likely to avoid deeper association with the promoted service in order to minimize the risk related to privacy disclosure. Based on these arguments, we posit that:

**Hypothesis 5a:** High social anxiety will lead to less loyalty.

**Hypothesis 5b:** High situational involvement will lead to less loyalty.

**Hypothesis 5c:** As situational involvement increases, higher social anxiety will exhibit a more negative effect on loyalty.

## **Methodology**

### ***Focus Group***

To create realistic scenarios, we first established four focus groups, each of which consisted of five key informants. Key informants are a select group of people who are especially knowledgeable or experienced about certain issues or problems and are willing to share their “expert” opinions [30]. Our sample consisted of a heterogeneous set of nonstudent mobile users who considered themselves to be frequent users of QR code promotions. Specifically, we first recruited voluntary participants through announcements on a research firm’s Web site, then chose those who had accessed or scanned more than ten QR codes per month during the last three months. Because the only available industry survey, conducted in 2009, reports that the average QR code access frequency among consumers is 1.24 codes per week [48], a monthly average is approximately five codes; thus, a regular access of ten codes per month would be an indication of an expert.

The focus group sessions consisted of two phases. First, one week before the focus group session, participants were instructed to save eight QR codes in their mobile device. In doing so, they were also asked to note their thoughts, impressions, or perception of these codes. The objective of this task was to ensure their self-reported QR code access frequency and to have discussion stimuli based on real samples. Second, the focus group interviews were performed with a professional moderator. On average, each session lasted 120 minutes. During the session, open-ended questions were used to extract activities, anecdotal stories, impressions, thoughts, emotions, and perceptions related to the QR codes that the participants had collected before the session. All the conversations during the focus group sessions were tape-recorded with the consent of the participants.

Our focus groups revealed two interesting findings. First, QR codes were normally used in conjunction with loyalty programs. Most key informants contended that QR codes often led to an e-mail newsletter or news alert subscription with loyalty membership, or a direct link to an e-mail address to register for membership. Second, some respondents claimed that they felt somewhat reluctant to access QR codes in crowded places when surrounded by strangers because scanning QR codes may be seen as an odd, eccentric, or improper behavior, drawing attention to oneself.

### ***Scenario Creation***

Based on the focus group results, we created four scenarios based on QR code promotion [26]. Two independent variables were manipulated: the level of social anxiety (high versus low) and the level of situational involvement (high versus low). With regard to the former, social anxiety was manipulated according to the perceived crowd. Prior research in clinical psychology indicates that meeting or facing unknown “others” in public places is one of the most important causes of social phobia or anxiety [31].

In terms of the second independent variable, situational involvement, we chose a bank and a supermarket as entities offering high- and low-involvement services, respectively. The basis of the high-involvement scenario presumes that a client with an inactive savings account is given a QR code promotion leaflet that offers immediate cash back if the client participates in the bank's loyalty program by subscribing to e-mail newsletters. In the low-involvement scenario, the service is replaced by a famous supermarket chain that is promoting a loyalty program in the same way. The only difference from the bank scenario is in how the cash is awarded in that the supermarket deposits the amount to membership cards in the form of "points." Cashback was chosen because it represents immediate rewards (e.g., discounts or price cuts offered to customers at the point of sale), which have been proven to be more effective than delayed rewards (e.g., vouchers or coupons redeemable at a later date from the point of sale) [25].

The manipulations of social anxiety and situational involvement are combined such that the scenario begins with a description of the location and the context (to prime the subjects accordingly), followed by details of the QR code promotion. For both the bank and supermarket contexts, the high and low social anxiety scenarios are portrayed as follows, respectively:

You are waiting for a friend in a plaza, which is located in front of a train station. Your friend is taking a long time to arrive. As you were walking toward the station, somebody handed you a promotional flyer. The flyer describes a loyalty program of a famous bank (supermarket). In this bank (supermarket), you have a savings account (shopping loyalty card) that has been practically inactive. The flyer has a QR code that you can scan to access the firm's campaign Web site with your mobile device. If you subscribe to an e-mail newsletter, the bank (supermarket) will deposit \$50 cash (\$50 worth of bonus points) in your account (loyalty account). The promotion will end tomorrow. In order to participate in this campaign, you need to register your name, birth date, home address, marital status, and annual income. You are wondering what you should do.

High social anxiety: The plaza is very crowded, and a lot of people are passing by you. Your friend seems to be running very late. . . .

Low social anxiety: The plaza is very deserted, and there is nobody around you. Your friend seems to be running very late. . . .

## ***Dependent Measures***

Most of the measures used in this study were adapted from prior research. Information privacy concerns have been conceptualized as a multidimensional construct [28, 51]. However, because of the limitations of the questionnaire length, we elected instead to control for general privacy concerns, as previously proposed by Lwin et al. [27]. Intentions to protect, fabricate, or withhold were measured by the items adapted from Lwin et al. Loyalty was conceptualized as a second order of repeat intention and WOM as suggested by Keh and Lee [25]. The wording of each item was adapted to the context of QR code mobile promotion. They were all based on seven-point Likert-

type scales, in tandem with what was asked (from 1 = completely disagree to 7 = completely agree).

## **Surveys**

A quasi-experimental survey of mobile users was conducted in Japan in October 2010. We recruited 680 participants from a research firm's online panel. In an attempt to minimize social desirability bias, only those who had previously accessed QR codes were chosen. A stratified sampling was conducted from the research firm's online panel so that the respondents' demographic distribution could match approximately that of the general Japanese population. We used a  $2 \times 2$  between-subject design in which 170 participants were randomly assigned to each of the four scenarios. The sample was almost equally divided between males and females, with occupational composition approximated to the Japanese population. The participants were asked to read and complete the questionnaire. Missing or incomplete data were eliminated from the data set, leaving 667 usable data for the subsequent analysis. The total number of respondents per scenario is shown in Table 1.

## **Manipulation Check**

Nine items from Mattick and Clarke's social interaction anxiety scale were adapted in a context of our experimental manipulation [31]. The  $t$ -test results revealed that the manipulations were successful. Specifically, the anticipated main effects were significant for high and low social anxiety ( $t = 3.91, p < 0.001$ ). Similarly, situational involvement was measured by a scale proposed by Mittal [34]. The involvement level for the two types of services included in the scenarios was found to be statistically different ( $t = 8.82, p < 0.001$ ), in the manipulated direction. The Appendix lists the items used for the manipulation check.

## **Results**

### **Response Bias**

We examined the common method bias using two procedures. First, we applied a confirmatory factor-analytic approach to Harman's one-factor test. As suggested by Podsakoff et al. [40], a poor fit for the one-factor model would suggest that common method variance does not pose a serious threat. In our study, the one-factor model yielded  $\chi^2_{152} = 7,673.21$ . Compared with  $\chi^2_{131} = 388.57$  of the measurement model, the fit is considerably worse, suggesting that common method bias is not a serious threat in this study. Second, we employed a single-factor method that includes all the measures as indicators of one-factor measurement model. This approach yielded a  $\chi^2_{105} = 370.64$ , which is considerably worse than the  $\chi^2_{131} = 388.57$  of the measurement model, thus suggesting that common method bias is not a serious threat in the study [40].

**Table 1. Final Sample Size per Scenario ( $n = 667$ ).**

<b>Social anxiety</b>	<b>Situational involvement</b>	
	<b>Bank</b>	<b>Supermarket</b>
High (crowded)	Scenario 1 (173)	Scenario 2 (160)
Low (deserted)	Scenario 3 (162)	Scenario 4 (172)

### ***Measurement Model***

We conducted a confirmatory factor analysis (CFA) using LISREL 8.8 (maximum likelihood method) to assess the validity and reliability of our constructs. The results of the seven-factor CFA with all the construct items are shown in Table 2. This measurement model provided an acceptable fit:  $\chi^2_{131} = 388.57$ ,  $\chi^2/\text{df}$  (degrees of freedom) = 2.96 ( $p = 0.12$ ), GFI (goodness-of-fit index) = 0.94, AGFI (adjusted goodness-of-fit index) = 0.92, CFI (comparative fit index) = 0.98, NFI (normed fit index) = 0.97, RMSEA (root mean square error of approximation) = 0.05, RMSEA range = 0.04 to 0.06. The factor loadings for each individual indicator on their respective constructs were all statistically significant ( $p < 0.001$ ), establishing convergent validity. Since our research contains several multi-item scales, we investigated the psychometric properties of the measures through the composite reliability index [5] and the average variance extracted (AVE) [18]. As shown in Table 2, both indexes exceeded the recommended benchmarks of 0.60 and 0.50, respectively, which are the cutoff values or the lowered threshold for exploratory studies [19].

Discriminant validity is the extent to which a construct truly differs from neighboring constructs [19]. Evidence of discriminant validity among the dimensions was provided by two different procedures recommended in the literature. First, the 95 percent confidence interval constructed around the correlation estimate between two latent variables never includes the value 1 [1]. Second, the square roots of the AVE were compared with the correlations among constructs. As Table 3 shows, the diagonal elements (the square roots of the AVE) are greater than the off-diagonal elements in the same row and column (the correlation between latent constructs), in support of discriminant validity [18].

Taken together, our CFA results provide adequate evidence of both convergent and discriminant validity, as well as reliability.

### ***Invariance Testing***

To test whether the measurement model is invariant between the four scenarios considered, a multigroup analysis was performed in which the unconstrained and constrained models were estimated simultaneously across groups. This



**Table 2. Confirmatory Factor Analysis Results.**

Construct items	Standardized $\lambda$
Information privacy concerns <sup>a</sup> ( $\alpha = 0.91$ ; CR = 0.91; AVE = 0.77)	
How concerned are you that your personal data may be used for purposes other than the reason for which you provided the information?	0.88
How concerned are you about your online personal privacy on this Web site?	0.84
How concerned are you about this Web site sharing your personal information with other parties?	0.91
Intention to fabricate <sup>a</sup> ( $\alpha = 0.88$ ; CR = 0.88; AVE = 0.70)	
I would consider making up a fake e-mail address to avoid releasing my real e-mail address.	0.85
To participate in the campaign, I would open a free e-mail account and register with the e-mail newsletter so that I can receive the incentive without divulging my real e-mail address.	0.87
When registering with this e-mail newsletter, I would only fill up data partially.	0.79
Intention to protect <sup>a</sup> ( $\alpha = 0.85$ ; CR = 0.85; AVE = 0.65)	
When I participate in this campaign, I would use a special application or software to protect my e-mail address from spammers.	0.85
After registering with the e-mail newsletter and obtaining the incentive, I would access the company's Web site to unsubscribe to the service.	0.84
After registering with the e-mail newsletter, I would use my security system or anti-virus program to filter and delete these messages automatically.	0.71
Intention to withhold <sup>a</sup> ( $\alpha = 0.91$ ; CR = 0.91; AVE = 0.77)	
I would be reluctant to register with this e-mail newsletter.	0.84
I would refuse to provide any personal data for this campaign.	0.89
I would avoid participating in this campaign.	0.89
Repurchase intention <sup>b</sup> ( $\alpha = 0.87$ ; CR = 0.87; AVE = 0.80)	
I am likely to return to the bank/supermarket.	0.88
In the future I intend to use the services offered by the bank/supermarket again as I used to do.	0.91
Word of mouth <sup>b</sup> ( $\alpha = 0.84$ ; CR = 0.84; AVE = 0.72)	
I would highly recommend the bank/supermarket to my friends and family.	0.95
I would say positive things about the bank/supermarket to other people.	0.70
Fit indexes: $\chi^2_{(131)} = 388.57$ ( $p = 0.12$ ), $\chi^2/df = 2.96$ , GFI = 0.94, AGFI = 0.92, CFI = 0.98, NFI = 0.97, RMSEA = 0.05.	
Notes: $\alpha$ = Cronbach's alpha, CR = composite reliability, AVE = average variance extracted. The results are based on the full sample across all scenarios. The literature generally recommends CR and AVE greater than 0.60 and 0.50, respectively [19]. <sup>a</sup> Adapted from [27]. <sup>b</sup> Adapted from [25].	

procedure yielded a chi-square difference of 57.30 ( $df = 43$ ) in the measurement weights, which was statistically nonsignificant ( $p = 0.08$ ). The next constrained model in structural covariances produced a chi-square difference of 172.35 ( $df = 132$ ), which was statistically significant ( $p = 0.05$ ). However, it is widely accepted that the equality of covariances represents an overly restrictive test of the data [12]. Thus, we concluded that there was factorial invariance of the measuring instrument used in the four scenarios considered.

**Table 3. Discriminant Validity.**

	Number of items	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. Information privacy concerns	3	5.57	1.15	0.88					
2. Intention to fabricate	3	3.61	1.45	-0.04	0.84				
3. Intention to protect	3	3.79	1.35	-0.01	0.74	0.81			
4. Intention to withhold	3	4.53	1.40	0.42	-0.07	0.03	0.88		
5. Repurchase intention	2	3.96	1.37	-0.26	0.21	0.15	-0.43	0.90	
6. Word of mouth	2	3.99	1.39	-0.12	0.16	0.09	-0.26	0.47	0.85

Fit indexes:  $\chi^2_{131} = 388.57$  ( $p = 0.12$ ),  $\chi^2/\text{df} = 2.96$ , GFI = 0.94, AGFI = 0.92, CFI = 0.98, NFI = 0.97, RMSEA = 0.05.

Notes: *M* = mean, *SD* = standard deviation. The results are based on the full sample across all the scenarios. Diagonal elements are the square root of average variance extracted between the constructs and their indicators. Off-diagonal elements are correlations between the constructs.

## Hypotheses Testing

Means and standard deviations of the constructs under experimental conditions are shown in Table 4.

H1a and H1b posit the main effect of each moderating variable, social anxiety and level of situational involvement, respectively, and H1c contemplates the interaction effect of both on information privacy concerns. To test these hypotheses, a two-way analysis of variance (ANOVA) was conducted (Table 5). Our findings reveal a significant main effect of the level of involvement ( $F_{1,663} = 3.35, p < 0.001$ ) in the hypothesized direction, although that of social anxiety was statistically insignificant. Thus, our data provide support only for H1b, but not for H1a. As for H1c, the interaction effect of both moderators was not significant. Thus, H1c was not supported.

In H2a and H2b, we postulate the main positive effects of social anxiety and situational involvement, respectively, on intention to fabricate personal information. Our findings ring true for these predictions: When social anxiety is high, consumers are more inclined to fabricate their personal data ( $F_{1,663} = 10.64, p < 0.01$ ); the same pattern was observed for situational involvement ( $F_{1,663} = 4.93, p < 0.05$ ) (Table 6). Thus, H2a and H2b were both supported.

H2c posits the interaction effect between social anxiety and situational involvement on intention to fabricate. Our ANOVA rings true for this prediction. Thus, H2c was also supported.

Similar effects were predicted in H3a–H3c on the intention to protect personal information. Our ANOVA results support our hypothesized impact of social anxiety on intention to protect personal data ( $F_{1,663} = 6.50, p < 0.05$ ), but no significant main effect of situational involvement was found on this dependent variable (Table 6). As predicted in H3c, our results confirmed the interaction effect of both moderators: When situational involvement is high, social anxiety produced stronger positive effects on intention to protect personal information. Therefore, H3a and H3c were supported, but H3b was not. Figure 2 shows the significant interaction effects of social anxiety and situational involvement on intention to fabricate (a) and to protect personal information (b).

H4a–H4c hypothesize the main positive effects of social anxiety and situational involvement and the interaction effect of both moderators on intention to withhold participation. As for the main effects, our ANOVA results give support for our hypothesized impact of situational involvement ( $F_{1,663} = 12.47, p < 0.001$ ) but not for the impact of social anxiety on this dependent variable (Table 6). Also, such an interaction effect was not observed in terms of intention to withhold participation. Thus, only H4b was supported by our data, and both H4a and H4c were rejected.

Finally, H5a–5c address loyalty as the dependent variable. Our ANOVA suggests that the main effect of social anxiety on this variable was statistically insignificant (Table 7). Thus, H5a was not supported. However, consumers perceived less loyalty when the level of situational involvement was high ( $F_{1,663} = 14.09, p < 0.001$ ). Therefore, H5b was supported. H5c addresses a significant interaction effect between social anxiety and situational involve-

**Table 4. Means and Standard Deviations for Each Scenario.**

<b>Manipulations</b>	<b>Information privacy concerns</b>		<b>Intention to fabricate</b>		<b>Intention to protect</b>		<b>Intention to withhold</b>		<b>Loyalty</b>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
High SA										
High SI	5.77	1.08	3.79	1.41	4.00	1.44	4.78	1.38	3.85	1.31
Low SI	5.47	1.18	3.78	1.39	3.84	1.22	4.46	1.31	4.08	1.11
Low SA										
High SI	5.51	1.16	3.17	1.38	3.52	1.32	4.65	1.45	3.76	1.18
Low SI	5.48	1.10	3.67	1.52	3.80	1.33	4.22	1.39	4.21	1.07

*Notes:* *M* = mean, *SD* = standard deviation, SA = social anxiety, SI = situational involvement. These values are based on one of the four scenarios.

**Table 5. Hypotheses Testing for Information Privacy Concerns.**

<b>Moderator</b>	<b>High SI</b>			<b>Low SI</b>		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
High SA	173	5.77	1.08	160	5.47	1.18
Low SA	162	5.51	1.16	172	5.48	1.10
<b>ANOVA</b>	<i>df</i>	<i>MS</i>	<i>F</i>	$\eta^2$	<i>p</i>	
SA	1	0.20	1.92	0.003	0.66	
SI	1	10.77	3.35	0.005	< 0.001	
SA × SI	1	1.13	2.29	0.003	0.31	
Error	663	753.87				

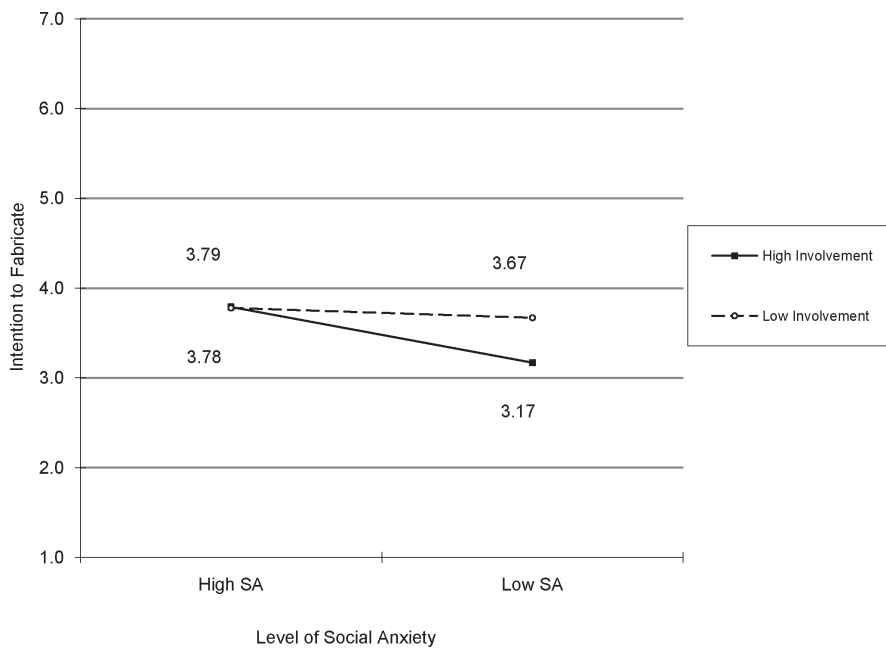
*Notes:* *M* = mean, *SD* = standard deviation, SA = social anxiety, SI = situational involvement, *df* = degrees of freedom, *MS* = mean square.

**Table 6. Hypotheses Testing for Behavioral Intentions.**

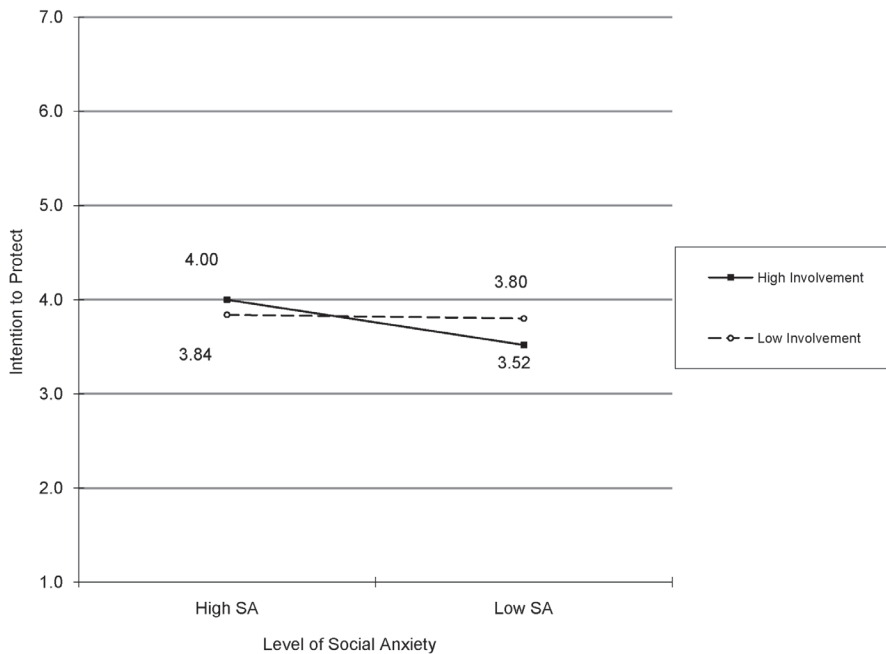
<b>Dependent variables</b>	<b>ANOVA results</b>					
	<b>Intention to fabricate</b>		<b>Intention to protect</b>		<b>Intention to withhold</b>	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
SA	10.64	< 0.01	6.50	< 0.05	2.85	< 0.10
SI	4.93	< 0.05	0.30	0.58	12.47	< 0.001
SA × SI	5.19	< 0.05	4.46	< 0.05	0.23	0.62
<b>Manipulations</b>	<b>Intention to fabricate</b>		<b>Intention to protect</b>		<b>Intention to withhold</b>	
High SA						
High SI	3.79		4.00		4.78	
	(1.41)		(1.44)		(1.38)	
Low SI	3.78		3.84		4.46	
	(1.39)		(1.22)		(1.31)	
Low SA						
High SI	3.17		3.52		4.65	
	(1.38)		(1.32)		(1.45)	
Low SI	3.67		3.80		4.22	
	(1.52)		(1.33)		(1.39)	

*Notes:* SA = social anxiety, SI = situational involvement. Numbers in parentheses indicate standard deviations.

ment on loyalty. Our results indicate that this is not true in our study: The interaction effect between social anxiety and situational involvement was not significant. Thus, H5c was not supported by our data. Hypotheses-testing results are summarized in Table 8.



(a) Interaction effect between social anxiety and involvement on intention to fabricate personal information



(b) Interaction effect between social anxiety and involvement on intention to protect personal information

**Figure 2. Interaction Effects**

**Table 7. Hypotheses Testing for Loyalty.**

<b>Moderator</b>	<b>High SI</b>			<b>Low SI</b>		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
High SA	173	3.85	1.31	160	4.08	1.11
Low SA	162	3.76	1.18	172	4.21	1.07
<b>ANOVA</b>	<i>df</i>	<i>MS</i>	<i>F</i>	$\eta^2$	<i>p</i>	
SA	1	0.06	0.04	0.000	0.83	
SI	1	19.60	14.09	0.021	< 0.001	
SA $\times$ SI	1	1.89	1.36	0.002	0.24	
Error	663	1.39				

*Notes:* *M* = mean, *SD* = standard deviation, SA = social anxiety, SI = situational involvement, *df* = degrees of freedom, *MS* = mean square.

## Discussion

One of the aims in sales promotion is to boost short-term sales, and this requires a quick reaction. Drawing upon utility maximization theory, this study examines consumers' reaction toward a QR code mobile promotion that ends soon, but offers immediate incentives. Our major concern lies in the moderating effects of social anxiety and situational involvement on the key dependent variables: information privacy concerns, defensive responses (i.e., intention to protect, fabricate, or withhold), and loyalty. Our rationale for this study scenario is that mobile promotion is unique and most effective in the right place at the right time. The findings from our experimental study offer mixed but interesting implications.

## Theoretical Implications

Optimizing benefits can lead to several alternative ways of concealing one's identity. Theoretically, our study achieves two main goals. First, in terms of utility maximization theory, the results are mixed, but the study seems to corroborate our basic propositions. When consumers face a QR code mobile promotion associated with high situational involvement under high social anxiety, they tend to feel strong concerns over information privacy disclosure and so protect or fabricate their true identity. As a result, even an attractive and immediate incentive cannot build the expected loyalty. Second, the study makes important contributions to the literature because it incorporates two moderation variables associated with one of the most important characteristics in m-commerce: context. We examined two contextual variables, social anxiety and situational involvement. To our knowledge, this is one of the first attempts to explore these variables in an empirical setting of m-commerce.

This study conceptualized social anxiety as perceived pressure or discomfort arising from the surroundings in the sense that consumers feel too



**Table 8. Summary of Hypotheses-Testing Results.**

<b>Hypotheses</b>		<b>Results</b>
H1a	High social anxiety will lead to greater information privacy concerns.	Not supported
H1b	High situational involvement will lead to greater information privacy concerns.	Supported
H1c	As situational involvement increases, higher social anxiety will exhibit a more positive effect on information privacy concerns.	Not supported
H2a	High social anxiety will lead to greater intention to fabricate personal information.	Supported
H2b	High situational involvement will lead to greater intention to fabricate personal information.	Supported
H2c	As situational involvement increases, higher social anxiety will exhibit a more positive effect on intention to fabricate personal information.	Supported
H3a	High social anxiety will lead to greater intention to protect personal information.	Supported
H3b	High situational involvement will lead to greater intention to protect personal information.	Not supported
H3c	As situational involvement increases, higher social anxiety will exhibit a more positive effect on intention to protect personal information.	Supported
H4a	High social anxiety will lead to greater intention to withhold personal information.	Not supported
H4b	High situational involvement will lead to greater intention to withhold personal information.	Supported
H4c	As situational involvement increases, higher social anxiety will exhibit a more positive effect on intention to withhold personal information.	Not supported
H5a	High social anxiety will lead to less loyalty.	Not supported
H5b	High situational involvement will lead to less loyalty.	Supported
H5c	As situational involvement increases, higher social anxiety will exhibit a more negative effect on loyalty.	Not supported

uncomfortable to access a QR code when in an unknown crowd. Thus, the social anxiety depicted in our research is not entirely comparable to that of Dabholkar and Bagozzi [13]. They operationalized consumers' perceived crowding in the sense of a participant holding back others before placing an order through the examined technology; however, in this scenario, the crowd around the participant does not necessarily wait for the participant to decide whether to disclose personal data. In this light, our conceptualization of social anxiety focuses on conscious attention directed outwardly or toward the environment, rather than inwardly or toward the self. Outward consciousness may be relevant in other types of promotional techniques, including offline (e.g., outside signage, on-street handouts) as well as online (e.g., near field communication, Bluetooth). Thus, this study may serve as an important stepping-stone in this field of research.

With regard to the moderating effects, the results seem clear, especially for situational involvement. We operationalized situational involvement as transitory or temporary involvement, as opposed to enduring involvement, which is based mainly on personal and persistent needs. Given the fact that a mobile promotion tends to aim at achieving a short-term goal, the "situation" is considered a crucial factor. Our study confirmed that, for a high level of situational involvement, consumers' defense mechanisms may be activated

by strong apprehension regarding privacy protection. As for social anxiety, the results are clearer in terms of defensive responses. When the level of social anxiety is high (e.g., located in a crowded and stressful situation), this seems to activate a defense mechanism, and so consumers feel more unfocused. Consistent with the literature on clinical psychology, social distress, or even shyness toward the surrounding environment, could cause consumers to discount the possibility of information privacy disclosure. These findings are especially relevant when consumers are asked to react on the site under time pressure.

This study viewed loyalty as the ultimate objective of a QR code mobile promotion. Specifically, we focused on loyalty in terms of inactive clients' repeat purchases (i.e., "coming back") and WOM. Only situational involvement had a significant moderation. However, from the fact that neither the main effect of social anxiety nor the interaction effect was significant, we may infer that social anxiety is unlikely to affect the consequences of such a mobile loyalty promotion. From the utility maximization perspective, this can be interpreted as showing that when consumers activate a defense mechanism, by either protecting or fabricating their identity, there may still be some potential to strengthen the relationship. However, loyalty is a complex process of long-term value creation; thus, our findings need to be considered an initial step in this regard. Still, our study makes a unique contribution in terms of technology-driven loyalty building in e-commerce and m-commerce research.

### ***Managerial Implications***

Managerially, our findings provide mobile marketers and advertisers with useful lessons in the implementation of QR code promotion. First, practitioners should be aware that QR code promotion is a practical and useful tool for bridging relationships between a firm and its clients. In this light, our focus groups indicated that the majority of actual QR code promotion is linked in some way to loyalty membership programs. An accelerated proliferation of QR code in many parts of the world would provide firms with the means to integrate this innovative technology into their holistic marketing strategy.

On the other hand, our findings indicate that the use of QR code promotion may significantly depend on its context, whether physical or psychological. The results on social anxiety suggest that trying to distribute cross-media campaign leaflets in a crowded space may activate consumers' defense mechanisms because they feel disturbed or uncomfortable when focusing on the content of such a promotion in that type of setting. While delayed access is possible, many promotions aim at achieving prompt access to the target object by providing an attractive or immediate incentive.

One way to minimize social anxiety is the use of QR code in in-house signage or brochures displayed in *indoor* public places—hotel lobbies, bank foyers, waiting rooms, and customer service areas. It seems that QR codes are more of a pull-type tool rather than a push-type tool; thus, distributing the code-printed handouts in a proactive way is simply a mismatch between

its nature and implementation. Based on our study results, service marketers should consider a holistic pull-type campaign, using the QR code as an information window from which consumers dare to glance at its content and offer before making any commitment.

Another way to improve the effectiveness of such QR code promotion may lie in situational involvement. Given the definition of this variable, firms should minimize, for example, the decision irrevocability or personal risk involved in the decision by loosening or simplifying the terms and conditions of the promotion. The obvious advice would be to indicate explicitly that their personal information will be neither used by nor sold to any third party. Besides the legislation in practice, firms should also take initiatives to create more rigorous self-regulatory moves toward consumer privacy protection.

## **Limitations and Future Research Suggestions**

To make our findings more objective, we should recognize a few limitations. First, our study used a scenario method without providing “real” stimuli. While the majority of the respondents had a sufficient level of QR code usage experience, the experimental settings were only described and not experienced. This point should be taken into account in interpreting the study results. Second, while the study carefully chose users with sufficient experience with QR codes, nonusers’ perceptions are not taken into account. Furthermore, this study used only two types of services, a bank and a supermarket, which limits the generalizability of the findings.

In addition to overcoming these limitations, future research should address the following issues. Although general information and anecdotal success stories have been published in trade journals, scholars’ knowledge of actual QR code usage is very limited. A comprehensive content analysis of sample codes from diverse media may be a useful initial step in deepening our understanding. Second, although our research conducted key-informant focus groups, this type of qualitative inquiry should be expanded. For example, an ethnographic approach might provide additional insights into consumers’ daily use of, and perceptions on, QR codes. Finally, future exploration of cross-channel consumer behavior via QR codes should be sought. To our knowledge, QR codes (and derivatives) are one of the few technological alternatives that enable consumers to “jump” from print media to the virtual world. Future research should explore whether the scope of this research could be extended to any other alternative interaction modalities, such as near field communication or Bluetooth.

## **NOTES**

1. An attempt by the attacker to collect financial information from the subscriber.

2. A phone number is embedded in the SMS message, and if the subscriber calls or texts the number, premium rate charges are unwittingly paid to the attacker.

## REFERENCES

1. Anderson, J.C., and Gerbing, D.W. Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, 103, 3 (1988), 411–423.
2. Andrews, J.C.; Durvasula, S.; and Akhter, S.H. A framework for conceptualizing and measuring the involvement construct in advertising research. *Journal of Advertising*, 19, 4 (1990), 27–40.
3. Apple's App Store downloads top 10 billion. Apple Press Info, Cupertino, CA, January 22, 2011 (available at [www.apple.com/pr/library/2011/01/22appstore.html](http://www.apple.com/pr/library/2011/01/22appstore.html)).
4. Awad, N.F., and Krishnan, M.S. The personalization privacy paradox: An empirical evaluation of information transparency and the willingness to be profiled online for personalization. *MIS Quarterly*, 30, 1 (2006), 13–28.
5. Bagozzi, R.P., and Yi, Y. On evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16, 1 (1998), 74–94.
6. Barwise, P., and Strong, C. Permission-based mobile advertising. *Journal of Interactive Marketing*, 16, 1 (2002), 14–24.
7. Beatty, S.E., and Smith, S.M. External search effort: An investigation across several product categories. *Journal of Consumer Research*, 14, 1 (June 1987), 83–95.
8. Belk, R.W. An exploratory assessment of situational effects in buyer behavior. *Journal of Marketing Research*, 11, 2 (1974), 156–163.
9. Belk, R.W. Situational variables and consumer behavior. *Journal of Consumer Research*, 2, 3 (1975), 157–164.
10. Berendt, B.; Preibusch, S.; and Teltzrow, M. A privacy-protecting business-analytics service for on-line transactions. *International Journal of Electronic Commerce*, 12, 3 (Spring 2008), 115–150.
11. Bloch, P.H., and Richins, M.L. A theoretical model for the study of product importance perceptions. *Journal of Marketing*, 47, 3 (1983), 69–81.
12. Byrne, B.M. *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*. Mahwah, NJ: Lawrence Erlbaum, 2001.
13. Dabholkar, P.A., and Bagozzi, R.P. An attitudinal model of technology-based self-service: Moderating effects of consumer traits and situational factors. *Journal of the Academy of Marketing Science*, 30, 3 (2002), 184–201.
14. Dinev, T., and Hart, P. Internet privacy concerns and social awareness as determinants of intention to transact. *International Journal of Electronic Commerce*, 10, 2 (Winter 2005–6), 7–29.
15. Dowling, G.R., and Uncles, M. Do customer loyalty programs really work? *Sloan Management Review*, 38, 4 (1997), 71–82.
16. Duval, S., and Wicklund, R.A. *A Theory of Objective Self Awareness*. New York: Academic Press, 1972.
17. Fenigstein, A.; Scheier, M.F.; and Buss, A.H. Public and private self-consciousness: Assessment and theory. *Journal of Consulting and Clinical Psychology*, 43, 4 (1975), 522–527.
18. Fornell, C., and Larcker, D.F. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18, 1 (1981), 39–50.

19. Hair, J.F.; Black, W.C.; Babin, B.J.; Anderson, R.E.; and Tatham, R.L. *Multivariate Data Analysis*. Upper Saddle River, NJ: Prentice Hall, 2006.
20. Hartman, L.M. A metacognitive model of social anxiety: Implications for treatment. *Clinical Psychology Review*, 3, 4 (1983), 435–456.
21. Hope, D.A.; Gansler, D.A.; and Heimberg, R.G. Attentional focus and causal attributions in social phobia: Implications from social psychology. *Clinical Psychology Review*, 9, 1 (1989), 49–60.
22. Houston, M.J., and Rothschild, M.L., Conceptual and methodological perspectives on involvement. In S.C. Jain (ed.), *Research Frontiers in Marketing: Dialogues and Directions*. Chicago: American Marketing Association, 1978, pp. 184–187.
23. Kang, J. Information privacy in cyberspace transactions. *Stanford Law Review*, 50, 4 (1998), 1193–1294.
24. Kashdan, T.B., and Robert, J.E. Social anxiety's impact on affect, curiosity, and social self-efficacy during a high self-focus social threat situation. *Cognitive Therapy and Research*, 28, 1 (2004), 119–141.
25. Keh, H.T., and Lee, Y.H. Do reward programs build loyalty for services? The moderating effect of satisfaction on type and timing of rewards. *Journal of Retailing*, 82, 2 (2006), 127–136.
26. Keppel, G. *Design and Analysis: A Researcher's Handbook*. Englewood Cliffs, NJ: Prentice Hall, 1991.
27. Lwin, M.O.; Wirtz, J.; and Williams, J.D. Consumer online privacy concerns and responses: A power–responsibility equilibrium perspective. *Journal of the Academy of Marketing Science*, 35, 4 (2007), 572–585.
28. Malhotra, N.K.; Kim, S.S.; and Agarwal, J. Internet users' information privacy concerns (IUIPC): The constructs, the scale, and a causal model. *Information Systems Research*, 15, 4 (2004), 336–355.
29. Mansfield, I. International survey of SMS spam finds 70% is financial fraud. Cellular-news, February 10, 2011 (available at [www.cellular-news.com/story/47832.php](http://www.cellular-news.com/story/47832.php)).
30. Marshall, M.N. The key informant technique. *Family Practice*, 13, 1 (1996), 92–97.
31. Mattick, R.P., and Clarke, J.C. Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behaviour Research and Therapy*, 36, 4 (1998), 455–470.
32. Mead, G.H. *Mind, Self, and Society*. Chicago: University of Chicago Press, 1934.
33. Milne, G.R.; Rohm, A.J.; and Bahl, S. Consumers' protection of on-line privacy and identity. *Journal of Consumer Affairs*, 38, 2 (Winter 2004), 217–232.
34. Mittal, B. Measuring purchase-decision involvement. *Psychology & Marketing*, 6, 2 (1989), 147–162.
35. Murry, J.P., and Dacin, P.A. Cognitive moderators of negative-emotion effects: Implications for understanding media context. *Journal of Consumer Research*, 22, 4 (March 1990), 439–447.
36. Okazaki, S., and Barwise, P. Has the time finally come for the medium of the future? Research on mobile advertising. *Journal of Advertising Research*, 51 (March 2011), 1–13.

37. Okazaki, S.; Li, H.; and Hirose, M. Consumer privacy concerns and preference for degree of regulatory control: A study of mobile advertising in Japan. *Journal of Advertising*, 38, 4 (2009), 63–77.
38. Phelps, J.E.; Nowak, G.; and Ferrell, E. Privacy concerns and consumer willingness to provide personal information. *Journal of Public Policy & Marketing*, 19 (Spring 2000), 27–41.
39. Pitkänen, O.; Mäntylä, M.; Välimäki, M.; and Kempainen, J. Assessing legal challenges on the mobile Internet. *International Journal of Electronic Commerce*, 8, 1 (Fall 2003), 101–120.
40. Podsakoff, P.M.; MacKenzie, S.B.; Lee, J.; and Podsakoff, N.P. Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 20, 5 (2003), 879–903.
41. QR code use explodes by 1200% in the last half of 2010. Mobio Identity Systems, Vancouver, BC, February 9, 2011 (available at [www.marketwire.com/press-release/mobio-identity-systems-inc-qr-code-use-explodes-by-1200-in-the-last-half-of-2010-1392772.htm](http://www.marketwire.com/press-release/mobio-identity-systems-inc-qr-code-use-explodes-by-1200-in-the-last-half-of-2010-1392772.htm)).
42. Rapee, R.M., and Heimberg, R.G. A cognitive-behavioral model of anxiety in social phobia. *Behaviour Research and Therapy*, 35, 8 (1997), 741–756.
43. Rettie, R.; Grandcolas, U.; and Deakins, B. Text message advertising: Response rates and branding effects. *Journal of Targeting, Measurement and Analysis for Marketing*, 13, 4 (2005), 304–312.
44. Richins, M.L., and Bloch, P.H. How enduring and situational involvement combine to create involvement responses. *Journal of Consumer Psychology*, 1, 2 (1992), 143–153.
45. Roseman, I.J.; Spindel, M.S.; and Jose, P.E. Appraisals of emotion-eliciting events: Testing a theory of discrete emotions. *Journal of Personality and Social Psychology*, 59, 5 (1990), 899–915.
46. Rust, R.T.; Kannan, P.K.; and Peng, N. The customer economics of Internet privacy. *Journal of the Academy of Marketing Science*, 30, 4 (2002), 455–464.
47. Schwarz, N. Feelings as information: Informational and motivational functions of affective states. In R.M. Sorrentino and E.T. Higgins (eds.), *Handbook of Motivation and Cognition*, vol. 2. New York: Guilford, 1990, pp. 527–561.
48. 76% of consumers access QR code with an average of 1.24 per week. Nikkei Business Publications, Tokyo, June 24, 2009 (available at <http://itpro.nikkeibp.co.jp/article/Research/20090624/332522/>).
49. Shaffer, R.R., and Sherrell, D.L. Consumer satisfaction with health-care services: The influence of involvement. *Psychology & Marketing*, 14, 3 (1997), 261–285.
50. Sirdeshmukh, D.; Singh, J.; and Sabol, B. Consumer trust, value, and loyalty in relational exchanges. *Journal of Marketing*, 66, 1 (2002), 15–37.
51. Smith, H.J.; Milberg, S.J.; and Burke, S.J. Information privacy: Measuring individuals' concerns about organizational practices. *MIS Quarterly*, 20, 2 (1996), 167–196.
52. Sooman, D. Bluesnarfing brings bluetooth blues. TechSpot, September 27, 2005 (available at [www.techspot.com/news/18877-bluesnarfing-brings-bluetooth-blues.html](http://www.techspot.com/news/18877-bluesnarfing-brings-bluetooth-blues.html)).
53. Survey on city dwellers in 2008. *Yomiuri Shimbun*, Tokyo, 2008.



54. Tsang, M.M.; Ho, S.C.; and Liang, T.P. Consumer attitudes toward mobile advertising: An empirical study. *International Journal of Electronic Commerce*, 8, 3 (Spring 2004), 65–78.
55. Vogel, S. Spam reporting service gets off to a good start. 160Characters, February 15, 2011 (available at <http://160characters.org/news/spam-reporting-service-gets-off-to-a-good-start/>).
56. Zaichkowsky, J.L. Measuring the involvement construct. *Journal of Consumer Research*, 12, 3 (1985), 341–352.
57. Zeithaml, V.A.; Berry, L.L.; and Parasuraman, A. The behavioral consequences of service quality. *Journal of Marketing*, 60, 2 (1996), 31–46.

## **Appendix: Scale Items Used for Manipulation Check**

### ***Social Anxiety (adapted from [31]; nine seven-point Likert scales)***

1. I get nervous when I have to use my mobile phone in this situation.
2. When I have to use my mobile phone under this circumstance, I first look around to make sure nobody is watching me.
3. I prefer not using my mobile phone in a situation like this.
4. I have difficulty using my mobile phone when I encounter this kind of situation.
5. I find myself worrying whether I should use my mobile phone in this situation.
6. When this kind of situation happens, I am nervous mixing with people I don't know well.
7. In a crowd like this, I feel I may say something embarrassing when talking on my mobile phone.
8. When mixing in a crowd like this, I find myself too nervous to use my mobile phone.
9. I am tense mixing in a crowd like this.

### ***Situational Involvement (based on [34]; four seven-point semantic differential scales)***

1. In selecting from many types and brands of this service available in the market, would you say that:  
  
I would not care at all as to which one I buy. / I would care a great deal as to which one to buy.
2. Do you think that the various types and brands of this service available in the market are all very much alike or are all very different?  
  
They are all alike. / They are all different.



3. How important would it be for you to make the right choice for this service?

Not at all important/Extremely important

4. In making your selection of this service, how concerned would you be about the outcome of your choice?

Not at all concerned/Very much concerned

SHINTARO OKAZAKI (shintaro.okazaki@uam.es) is an associate professor of marketing at the Universidad Autónoma de Madrid (Spain), where he received his Ph.D. His research focuses on mobile commerce, global branding, and information privacy concerns. His work has appeared in *Journal of Advertising*, *Journal of Advertising Research*, *International Journal of Advertising*, *Journal of International Marketing*, *Journal of Business Research*, *Journal of World Business*, *Psychology & Marketing*, *European Journal of Marketing*, *International Marketing Review*, *Tourism Management*, *Information & Management*, *Online Information Review*, *Journal of Computer-Mediated Communication*, *Computers in Human Behavior*, and *Internet Research*, among others. He serves on the editorial boards of *Journal of Advertising* (associate editor), *International Journal of Advertising*, *Journal of Public Policy & Marketing*, *Journal of Interactive Advertising*, *Electronic Markets*, and *Internet Research*, among others. Dr. Okazaki is also on the Executive Board of the European Advertising Academy (EAA). His honors include the 2011 Best Research Award by the KDDI Foundation, the 2010 Best Paper Award by the *Journal of Advertising*, the 2008 Best Academic of the Year from the Mobile Marketing Association, and the 2007 Best Reviewer from *International Journal of Advertising*.

MARÍA ÁNGELES NAVARRO-BAILÓN (angelesn@um.es) is an associate professor of marketing at the University of Murcia. She received her Ph.D. from the University of Murcia. Her main research areas are integrated marketing communications and mobile commerce. She has presented papers in conferences such as EMAC, ICORIA, and International Conference on Corporate and Marketing Communication. She has published in *European Journal of Marketing*, *Journal of Marketing Communications*, and *EuroMed Journal of Business*, among others.

FRANCISCO-JOSE MOLINA-CASTILLO (fjmolina@um.es) is an associate professor of marketing at the University of Murcia. He received his Ph.D. from the University of Murcia. His main research areas are innovation and new product development, mobile commerce, and electronic marketing. He has published in *Journal of Product Innovation Management*, *Industrial Marketing Management*, *Technovation*, *Information & Management*, *International Journal of Information Management*, and *International Journal of Internet Marketing and Advertising*, among others.