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Exploring Gender Effects in a Mobile Advertising Context: On the Evaluation of Trust, Attitudes, and Recall

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Abstract This study examines how gender affects mobile advertising acceptance in Japan. Drawing upon cultural, socioeconomic, and industry-specific factors, five hypoth- eses and two research questions are formulated for four dependent variables (trust, attitude toward the ad, attitude toward the brand, and ad recall) and two independent variables (gender and ad type). User frequency was considered a covariate. An empirical survey was conducted in Japan: Forty thousand respondents were randomly selected, and 3,254 responses were received. Two mobile campaigns (one durable and one nondurable good) were used as stimuli. Multivariate data analysis found significant multivariate effects as well as univariate effects. There was a significant interaction effect of gender and ad type on ad recall. In closing, the study's implications are discussed.

Keywords Advertising · Attitude · Internet · Mobile device

Introduction

Combining personal telephony with sophisticated technol- ogies, the mobile Internet has provided new opportunities to offer a diverse range of services. In particular, in many countries, mobile advertising has been widely accepted as a practical mode of direct marketing. In the USA, it was expected that, by 2005, mobile advertising and marketing spending would reach US $115 million and US $253 million, in conservative and aggressive scenarios, respectively. Both scenarios forecast that these figures would double by 2008 (eMarketer 2005).

However, with such spending growing at an astonishing pace, academics and practitioners alike have begun to recognize that an important question remains unanswered: Which consumer segments are more willing to accept mobile advertising? Intuitively, we expect it to be reasonably well adopted by consumers, given the worldwide penetration of Internet-enabled mobile handsets by leading mobile suppli- ers. On the other hand, the click-through rate of typical SMS advertising is reported to be very low (Marek 2006). There is also growing concern over privacy and security issues in the mobile Internet in general (Petty 2003).

The purpose of this study is to examine gender effects on mobile advertising adoption in Japan. Drawing upon cultural, socioeconomic, and industry-specific factors, the study posits that gender significantly influences how people perceive mobile advertising. The dependent variables are trust in mobile advertising, attitude toward the ad, attitude toward the brand, and unaided recall of mobile advertising, all of which have been identified as the most relevant variables in advertising effectiveness. The independent variables are gender, and ad type, with mobile Internet usage frequency being a covariate. Differences across the independent variables are tested via multivariate data analysis. As stimuli to address research hypotheses, two "pseudo" mobile-based campaigns were created and sent to the registered "opt-in" users of mobile advertising services. To examine their perceptions, these same users were then contacted with a structured questionnaire.

This research makes major contributions to the literature in two ways. First, to date, little research has focused on gender differences in Internet usage in Asia. Much prior research examines Western countries, with the majority employing US samples. However, cultural influences on gender may be dissimilar across cultures, and thus, existing knowledge may not apply to Asian countries. This study aims to establish a link between culture and Internet usage in Japan. Second, there is a dearth of research on gender and the mobile Internet in general. Our literature review found only one study, which examined mobile chat service adoption in Finland (Nysveen et al. 2005). Such scarcity of empirical evidence attests to the need for further research.

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In what follows, we first review the literature on gender effects in Internet usage, then examine both the cultural and socioeconomic factors affecting gender and mobile Internet usage in Japan. On this basis, we formulate research hypotheses and questions. After describing the methodology used in the study, we present the results, discuss the key implications, and recognize some important limitations.

Prior Research on Gender and Internet

Gender is often used as part of the social and cultural meanings associated with developing marketing strategy. According to Darley and Smith (1995), this is because gender samples are (1) easily identifiable, (2) accessible, (3) measurable, (4) responsive to marketing mix, (5) sufficient- ly large, and (6) profitable. Evidence has been found of important gender differences in human communication, including advertising (Wolin 2003). In the context of computer-mediated communications, it appears that much research on gender and the Internet "has consistently demonstrated that gender inequalities define professional and scholarly electronic communication and that men are over-represented in electronic communities" (Yang and Lester 2005, p. 151).

Prior research in the USA indicates that gender is one of the key attributes and predictors of online purchase intention, and the findings from earlier studies (Rodgers and Harris 2003;

Table 1 Review of gender effects in electronic commerce research.

Authors (year)	Research topic	Country	Sample size	Major findings
Weiser (2000)	Internet use patterns	USA	1,190	Males use Internet for entertainment and leisure, whereas females use it for interpersonal communication and educational assistance. Several gender differences were mediated by differences in age and Internet experience
Jackson et al. (2001)	Online communication and searching	USA	630	Females used e mail more while males used Web. Females reported more computer anxiety, least computer self efficacy, and less favorable and less stereotypic computer attitudes
Rodgers and Harris (2003)	Emotions, trust, and practicality in e commerce	USA	227	Females were less emotionally satisfied with e shopping, presumably because they were skeptical of this venue and did not find it as convenient as their male counterparts
Gilbert et al. (2003)	Technolophobia and mobile Internet technology.	USA	161	There was a significant relationship between feminine psychological gender and technophobia of mobile Internet devices.
Garbarino and Strahilevitz (2004)	Online purchase intentions and site recommendation	USA	(a) 260, (b) 276, (c) 182	Females were more risk averse in online purchasing, but a site recommendation from a friend significantly reduced their perceived risk and increased their willingness to buy online
Dittmar et al. (2004)	Online versus conventional buying motivations	USA	(a) 113, (b) 240	Gender differences in online buying drastically decreased. Females associate online buying with barriers (lack of social contact) and facilitators (economy, convenience, and efficiency) based on conventional buying
Phillip and Suri (2004)	Evaluation of promotional emails	USA	119	Females tended to appreciate promotional emails as a source of product information and coupons more; women were more concerned about privacy and preferred to use emails to build social contacts
Nysveen et al. (2005)	Mobile chat service adoption	Finland	684	Social norms and enjoyment were primary determinants of intention to use mobile chat service among females, but expressiveness was more important among males

Wolin and Korgaonkar 2003) suggest that Western females have rather wary views of e-commerce and the Internet in general. However, more recent explorations suggest that such gender differences have decreased as the Internet has become more mainstream, affordable, and easy to use (Weiser 2000). This reflects the recent drastic growth of female consumers in the online community (Garbarino and Strahilevitz 2004). As a result, recent research appears to focus more on qualitative differences in online usage behavior (Phillip and Suri 2004). Table 1 summarizes some of the recent explorations of gender effects in e-commerce literature. Clearly, much evidence is based on US samples, and little is known about the gender effect on Internet usage in the Asian countries.

In general, prior research indicates that women tend to engage in interpersonal and interdependent socialization, and are more likely to do so online than men. For this reason, women are likely to perceive email as having the feel and style of oral communication, because they can specify the message recipients, and may thus tailor their messages to reflect prior interactions and the nature of the relationship (Weiser 2000). In this regard, Jackson et al (2001) found that American females are indeed likely to use emails more than their male counterparts, but feel more computer anxiety and less computer self-efficacy. Males tend to browse the Web more than females. It appears that personalized, spontaneous, and interactive communication is much appreciated by female users, because social contacts serve as a pivotal venue that sustains women's same-sex friendships (Jackson et al. 2001). Phillip and Suri (2004) reported a similar observation. In a study of promotional emails in the USA, they found that American women prefer to use emails to build social contacts and an interpersonal information network. By the same token, the lack of social contact has been identified as the most important barrier that prevents females from shopping online in the USA (Dittmar et al 2004). Garbarino and Strahilevitz (2004) explored the gender effects on online shopping, and found that American women perceive a higher level of risk than men. However, if a friend recommends a site, women are more willing to purchase online. This implies that women seem more susceptible to the effects of interpersonal and interdependent relationships.

To date, little research has focused on gender differences in a mobile context. In Finland, Nysveen et al. (2005) extended the technology acceptance model and the theory of reasoned action, in the attempt to examine gender differences in mobile chat service adoption. Their findings are somewhat surprising. Although there were no signifi- cant differences across genders in ease of use and attitudes, expressiveness was a stronger driver of intention to use mobile chat services among males than among females. This seems to contradict a key claim in prior research in the traditional PC context: Women are more likely than men to use email to build social contacts.

Cultural Factors: Gender Egalitarianism

As in the preceding section, much prior research is based on US samples, except for Nysveen et al. (2005). Therefore, how much of the theory could apply to Japan? In this regard, a recent body of work from organizational and management science, entitled the GLOBE project (Global Leadership and Organizational Behavior Effectiveness Research Program), appears to offer very insightful information on cultural influence on gender (House et al. 2004).

In this project, over 160 researchers surveyed 17,000 middle managers in 62 countries. GLOBE outlined nine cultural dimensions: assertiveness, uncertainty avoidance, power distance, institutional collectivism, in group collec tivism, gender egalitarianism, future orientation, perfor mance orientation, and humane orientation. With regard to the first six dimensions, GLOBE draws in part on Hofstede's (1980) landmark study, but although the labeling may be similar, correlation analyses show that the two approaches are quite clearly differentiated. GLOBE provides data on the societal level, and explicitly differentiates between societal values and societal practices: The former primarily reflect the "should be" and, as such, the cultural values, and the latter primarily reflect the "as is" and, as such, the cultural practices.

Of interest to the present study, gender egalitarianism is defined as the degree to which a society minimizes gender role differences. In terms of societal values (should be), there was a significant difference between the USA (5.06) and Japan (4.33). However, for societal practices (as is), GLOBE classified the countries into three bands, and found that the USA (3.34) and Japan (3.19) belonged to the same "band," given that there was no significant differences between the two countries' scores (Emrich et al. 2004). In addition, the societal practices of gender egalitarianism are significantly correlated with the Human Development Index: the more gender egalitarian a society's current practices, the greater its members' knowledge and standard of living. Furthermore, the practice scores are also significantly correlated with women's economic activity, and women's purchasing power (Emrich et al. 2004). These findings are consistent with the role of the Internet in women's interpersonal and interdependent socialization, and their potential economic freedom in information seeking and purchasing decision. Hence, at the level of societal "practices," American and Japanese women may be on the same page in terms of their "perceived" Internet usage.

Socioeconomic Factors: Gendered Mobile Usage in Japan

Despite the general similarity in the societal practices of gender egalitarianism in the USA and Japan, a variety of socioeconomic factors still influence Japanese women's mobile adoption behavior. For example, in Japan, males have traditionally played a leading role in adopting new informa- tion technology, and the use of the PC Internet is still dominated by males. However, recent surveys show that females are more likely than males to use the mobile Internet, while more and more mobile Internet services now deliver attractive content related to women's wants and needs, including work, shopping, hobbies, and love (Habuchi et al. 2005). Why? Below, we suggest several reasons why females are more inclined to adopt the mobile Internet.

First, women's employment in the total workforce has increased considerably in Japan, but women are rarely found in the top ranks of organizations. Today there are female CEOs in 5.6% of Japanese companies, but in only .8% of companies listed on the stock exchange (Hart et al. 2006). Here, many obstacles to women's advancement in the Western countries also applied, but to a greater extent: sexism and gender-based stereotypes, exclusion from formal networks, lack of role models, and an unwelcoming corporate culture (Millar 2003). Thus, networking is a vital tool that helps Japanese women to assimilate into a male- dominated culture easier, and also gives them the collective power and confidence to advocate change and act for it within organizations (Habuchi et al. 2005). In this light, the mobile Internet serves as a practical tool for communicating, exchanging, and disseminating information among peers.

Second, Japanese women make up a significant majority of the buyers of consumer goods and services. The post-school, pre-marriage set does so much shopping and traveling that each year no fewer than five new magazines aimed at this segment begin publication in Japan (Griffy- Brown and Oakland, 2007). This consumer segment has been termed the "parasite singles," by which is meant unmarried young women who live with their parents, pay for neither groceries nor rent, and spend their entire income on themselves in shopping, leisure, and entertainment (Tolbert 2000). Okazaki (2004) pointed out that this segment exhibits the most flexible and favorable attitude toward mobile advertising in Japan, probably because they act as venturesome market mavens capable of adopting an innovative product, and diffusing information to their peers.

Third, in Japan, "kawaii (cute in English) culture" is widespread. Users often download cute symbols and characters to personalize their emails further, and to make the communication more memorable and intimate (Hjorth 2003). For example, the cute little kitten that appears on everything from bankcards to hot dogs, and is known as Hello Kitty, is now also seen dancing on i-mode screens. Male and female users use kawaii characters to much the same extent, but women appear better able to articulate the symbolic meanings of these characters (Hjorth 2003). It is thus easier for females to accept mobile advertising with cute symbols than it is for males. In a way, if the PC Internet is the men's "boy-toy," then the mobile Internet may have become the "girl-toy" in Japan, because it is considered not only a communication device, but also a fashion accessory (Sato and Kato, 2005).

Hypotheses and Research Questions

Based on the preceding discussions, the study posits hypotheses and research questions in terms of four dependent variables of gender effects on mobile advertising adoption in Japan: trust in mobile advertising, attitude toward the ad, attitude toward the brand, and ad recall.

Trust in Mobile Advertising

Increasing evidence suggests that mobile advertising has considerable potential to contribute to brand building (Okazaki et al. 2007). Among the various factors that affect the success of brand building, trust is a key determinant of consumers' positive perception of brand (Rodgers and Harris 2003). Gaining trust relates to a firm's or product's ultimate sales and profits, because trust reflects individuals' decisions about whether the imparted brand information is true or false. Hence, lack of trust, or skepticism, has been identified as one of the most important deterrents to e-commerce in general (Rodgers and Harris 2003). In the case of mobile advertising, trust becomes crucial because consumers must often make decisions, or take action, on the basis of uncertain informa- tion, because much of the wireless content does not provide physical cues to enable users to assess the quality of the firm behind the micro-browser screen. In the absence of physical cues, information flows have a critical role in engendering the psychological response that creates expectations about the reliability of future behavior and actions (Kolsaker and Payne 2002). In this light, Wells and Chen (1999) examined gender differences in trust and skepticism toward online shopping in the USA, and found that females were more skeptical than males of web-based activities in general. Similarly, Garbarino and Strahilevitz (2004) suggest that American females tend to perceive a higher level of risk in online purchasing than males. Because of the similar purchasing power of American and Japanese women, a similar tendency can be observed in a Japanese context. Thus, we posit:

H1 Mobile advertising will generally lead to greater trust among males than among females.

Attitude Toward the Ad

An attitude toward an object can be defined as an individual's internal evaluation of it on the basis of his or her beliefs (Fishbein and Ajzen 1975). Exposure to an advertising message for a specific brand first affects one's attitude toward the ad, which then mediates the attitude toward the brand. Subsequently, behavioral intention is formed as a consequence of this attitude formation (MacKenzie and Lutz 1989). Prior research in the USA indicates that email and other forms of computer-mediated communication tend to attract more female participants, because, both offline and online, "talk" makes up the substance of women's friendships (Weiser 2000). This study posits a similar tendency in Japan, as a result of Japanese women's strong desire for social networking. Furthermore, it was found that American females are more flexible and innovative in their ad recognition, and they exhibit a more stable attitude toward banner ads than males (Palanisamy 2005). Because mobile advertising can be seen as a new form of multimedia banner ads, the following hypothesis can be posed:

H2 Mobile advertising will generally lead to a more favorable attitude toward the ad among females than among males.

Attitude Toward the Brand

Meyers-Levy (1994) argues that females are likely to rely on left-hemisphere processing, which concerns the specificities and intricacies represented by stimulus information, and will eventually seek emotional benefits. In this respect, Phillip and Suri (2004) found that American women are more emotion- ally attached to their possessions than males, and are more likely than men to perceive favorably promotional emails with hypertext links for additional information. Such biological stimulus processing should be applicable to any culture: Hence Japanese women may also be likely to engage more than men in the effortful elaboration of email communications content. In addition, prior research indicates that American women tend to be sensitive to the monetary sacrifice involved, and perceive promotional incentives (e.g., coupons, sales information, etc.) more favorably than men, because they reduce such sacrifice (Phillip and Suri 2004). Given abundant evidence regarding the use of promotional incentives in mobile campaigns in Japan (Okazaki et al. 2007), we posit a similar tendency for Japanese women. Thus, we hypothesize

H3 Mobile advertising will generally lead to higher recall among females than among males.

Ad Recall

Recall has been recognized as one of the most important measures of advertising effectiveness, because it generates and sustains brand awareness (Willke 1993). Stapel (1998) argues that recall provides an objective indication of the level of interest an advertisement can generate, i.e., the number of people who actually pay attention to the advertisement. In this regard, Ewing et al. (1999) found that Australian women exhibited a higher recall of food advertisements than males, primarily because such ads are directed toward female adults consumers. By the same token, our literature review established that (1) Japanese women are generally the primary buyers of consumer goods and services, and (2) an increasing number of mobile Internet services target wom- en's wants and needs. Thus, it appears reasonable to assume that females will have a higher recall of mobile advertising than males. More formally,

H4 Mobile advertising will generally lead to higher recall among females than among males.

Ad Type

In product selection, females have been said to be more risk-averse (Zinkhan and Karande 1991), and more influenced by technological or functional complexity than males (Garbarino and Strahilevitz 2004). In general, durable goods involve much more purchase risk than nondurable ones, and females may perceive them adversely. In this light, prior research in the USA indicates that characteristics of masculinity, such as dominance, adventurousness, boldness, and leadership, are often attached to high-tech products, and this may cause females to exhibit anxiety and technophobia (Gilbert et al. 2003). By contrast, American females are more likely to purchase nondurable goods, such as clothing, on the Internet (Kim and Kim 2004; Rodgers and Harris 2003). This tendency appears to be generalizable to Japan, because fashion, cosmetics, and services are Japanese females' most popular purchases in mobile commerce (Senden Kaigi 2004). Hence, we posit that there will be significant interaction effects of gender and product type across the dependent variables. Specifically,

H5 Significant interaction effects will be found between gender and ad type on the dependent variables.

Usage Frequency

Gender effects may change when the frequency of mobile Internet usage is considered. First, prior research in the USA suggests that gender effect is a function of Internet usage, in that female consumers' intention to purchase online is stronger when they are willing to acquire the skills as- sociated with using the Internet (Yang and Lester 2005). That is, the level of Internet skill and access is a more consistent predictor of female consumers' online behavior: The higher their level of usage, the more likely they are to search for information and shop online (Garbarino and Strahilevitz 2004). Second, in the context of the mobile Internet, Okazaki (2004) also found that younger generations

Table 2 Summary of hypotheses and research questions.

Reference	Hypotheses/research questions
H1	Mobile advertising will generally lead to greater trust among males than among females
H2	Mobile advertising will generally lead to a more favorable attitude toward the ad among females than among males
H3	Mobile advertising will generally lead to higher recall among females than among males
H4	Mobile advertising will generally lead to higher recall among females than among males
H5	Significant interaction effects will be found between gender and ad type on the dependent variables
RQ1	Does mobile Internet usage frequency have an influence on the dependent variables?
RQ2	What effect will the gender have after controlling the effect of mobile Internet usage frequency?

in their 20s were more likely to use a mobile device, and thus, could more easily access a mobile-based Website in Japan. Thus, usage frequency may act as an important covariate of gender effects. Hence, two research questions are posed to explore and adjust the role of extraneous variation in the dependent variables:

RQ1 Does mobile Internet usage frequency have an influence on the dependent variables?
RQ2 What effect will the gender have after controlling the effect of mobile Internet usage frequency?

Table 2 summarizes the hypotheses and research ques- tions being tested.

Method

A large mobile advertising agency collaborated in this study, by creating the "pseudo" mobile advertising cam- paigns, and offering its push messaging service, which delivers the textual and visual information that advertisers send to opt-in users. We contacted two large Japanese manufacturers listed in the first section of the Tokyo Stock Exchange, both of which agreed to collaborate in the experiment, and to allow the use of their most popular brands as real stimuli in the campaign. One company manufactures handheld audio players (durable good), and the other puffed corn snacks (non-durable good). Both brands are firmly established in the Japanese market.

The design of the ads for the two brands was almost identical, except for product image (i.e., photos). After designing textual and visual information for the mobile ads, we created a promotional mobile site to which respondents could jump by clicking a banner in the ads saying "Please click here for further information." As an incentive to participate in the campaign, we offered a free ring-tone and a book coupon. One week after transmitting the push advertising, we sent a survey invitation via mobile device to the same opt-in users. By agreeing to participate in the survey, users could enter the mobile website, where the structured questionnaire was uploaded.

The questionnaire was in two parts. First, we asked for respondents' demographic information, such as gender, age, occupation, and so on. Second, the level of mobile Internet access was measured in seven levels (never, once a month, 2–3 times a month, once a week, 2–3 times a week, every day, and 2–3 times a day). Third, we included questions that corresponded to the three constructs mobile advertising trust, attitude toward brand, and advertising recall (i.e., unaided recall). All scale items were adopted from existent e-commerce literature and were modified for the mobile context. Mobile advertising trust was assessed by two items: "Regarding mobile advertising, I always think it's trustworthy," and "When I receive advertising messages in my mobile, I always trust them" (Cronbach's alpha=.67). Attitude toward mobile advertising was assessed by three items: "I really like receiving mobile advertising mes- sages," "Generally, I have a good feeling about mobile- based campaigns," and "I always think mobile advertising is useful" (Cronbach's alpha=.67). Advertising recall was assessed by three items: "I can remember very clearly that I saw this advertising," "I accessed and took a good look at the mobile campaign," and "I understood perfectly what mobile advertising says" (Cronbach's alpha=.83). All constructs were assessed using a multiple-item measure of five-point semantic differential scales, with 3 (cannot answer/determine) as an anchoring point.

For each brand, 40,000 pseudo-campaign messages were sent to opt-in users, who were randomly chosen from the agency's customer database. Thus, sampling error was approximately .5%. The response rate based on click- through was estimated at approximately 13% for the durable good (n=1,355) and 17% for the nondurable good (n=1,899).

Table 3 summarizes the respondents' characteristics in age and occupation. The proportions of male and female respondents are broken down in each age and occupational group for each ad type. In both ad types, the proportion of female respondents slightly outweighed that of males, but the differences in gender distribution across the two ads were not statistically significant (p=.423). However, when we examined the detailed distribution of age in each ad type, a chi-square test detected significant differences for

Table 3 Characteristics of the respondents (%).

	Durable goods (n=1,335)		Nondurable goods (n=1,899)		Total
	Male (n=582)	Female (n=753)	Male (n=801)	Female (n=1,098)	
Age					
>19 years old	26.3	31.5	21.5	28.7	27.1
20 24	23.2	29.5	22.0	25.9	25.3
25 29	21.0	20.7	21.3	20.1	20.7
30 34	17.2	12.1	21.7	15.5	16.5
35 39	12.0	5.8	13.4	9.3	10.0
40 44	.3	.3	.1	.2	.2
45 years old <	.0	.1	.0	.4	.2
Occupation					
Junior high/high school	15.8	18.3	12.5	15.8	15.6
University	18.7	17.5	15.6	16.2	16.8
Clerical/research	7.0	13.0	6.9	11.9	10.0
Administrative	18.6	4.9	18.2	4.5	10.5
Sales/service	18.7	19.4	20.2	21.4	20.2
Managerial	4.1	.3	3.5	.4	1.8
Skilled professional	10.5	8.2	13.2	8.9	10.1
Self employed	1.0	.0	1.6	.4	.7
Housewives	.0	11.4	.0	13.6	7.3
Unemployed/others	5.5	6.9	8.2	6.9	7.0

Durable goods, age: χ^2 =29.39, p<.001; durable goods, occupation: χ^2 =171.19, p<.001. Nondurable goods, age: χ^2 =32.57, p<.001; nondurable goods, occupation: χ^2 =254.54, p<.001

both durable good (χ^2 29.39, p<.001) and nondurable good (χ^2 32.57, p<.001). The primary reason for this appears to be that, in both ad types, females outweigh males in younger age groups, especially under 30 years old. By the same token, the differences in gender distribution across occupations were statistically significant for both durable good (χ^2 171.19, p<.001) and nondurable good (χ^2 254.54, p<.001).

Results

Measurement Assessment

Next, to assess the quality of our dependent measures, we examined construct validity, convergent validity, and reliability, by conducting a confirmatory factor analysis (CFA) with the generalized least square method via AMOS 5.0 (Byrne 2001). This assessment was performed sepa- rately for two sets of data, one durable good and one nondurable good. In each model, all items successfully loaded on their corresponding constructs with highly significant estimates, while standardized factor loadings were all above .5. However, because the central purpose of this study is to test our model independent of type of good advertised, the scale intervals of the latent constructs must be comparable across the two datasets. To this end, we assessed structural invariance for the durable and nondura- ble good samples. Following the sequential procedure suggested by Steenkamp and Baumgartner (1998), we attempted to perform a two-group model analysis in which the coefficients are constrained to be equal across the two models. Specifically, in the first model (base model), all the paths were allowed to be free across durable and nondura-

Table 4 Reliability assessment.

Constructs	Number of items	Alpha	Composite reliability	Average variance extracted
Mobile advertising trust	2	.67	.83	.53
Attitude toward mobile advertising	3	.67	.90	.50
Advertising recall	3	.83	.98	.70

All constructs were assessed using a multiple item measure of five point semantic differential scales, with 3 (cannot answer/determine) as an anchoring point.

Table 5 Means and standard deviations.

Group	Trust in mobile advertising		Attitude toward the ad		Attitude toward the brand		Ad recall	
	M	SD	M	SD	M	SD	M	SD
Durable good								
Male	3.71	.79	3.80	.72	3.91	.91	2.83	1.34
Female	3.76	.74	3.91	.66	4.02	.78	2.72	1.27
Nondurable good								
Male	3.67	.81	3.78	.75	4.24	.80	2.31	1.32
Female	3.76	.72	3.87	.66	4.32	.78	2.49	1.33

All constructs were assessed using a multiple item measure of five point semantic differential scales, with 3 ("cannot answer/determine") as an anchoring point.

ble good samples. In the second model (equal-constraint model), the measurement paths were constrained to be equal across the samples. Then, we compared the two models by the chi-square difference test, which was not statistically significant at $p < .05$. Thus, the two-group model is invariant across the two samples, and therefore, statistically comparable.

To test scale reliability and unidimensionality, we calculated Cronbach's alpha. However, while the advertising recall construct produced .83, both advertising trust and attitude toward ads resulted in .67, below the generally recommended minimum of .70 (Hair et al. 2006). We then performed a confirmatory factor analysis to compute composite reliability and average variance extracted, which are considered stricter measures of construct reliability (Byrne 2001). Amos 5.0 was used with maximum likelihood method. The model showed a good fit: GFI (goodness-of-fit index)=.99, CFI (comparative fit index)=.99, TLI (Tucker–Lewis index)=.98, and RMSEA (root mean square error of approximation)=.051. Based on the standardized coefficients, we calculated the composite reliability and average variance extracted (Table 4). The scores exceeded the generally recommended .50, and scale reliability and unidimensionality were thus deemed to be established (Hair et al. 2006).

Multivariate F ratios were generated from Pillai's trace statistic. Values enclosed in parentheses represent mean square errors.
[a] Multivariate df=4, 3,227
[b] Univariate df=1, 3,230
*p<.05
**p<.01
***p<.001

MANOVA

To examine the relationship between the independent and dependent variables, we first calculated the mean values and standard deviations of male and female respondents for each ad type. The results are shown in Table 5. With the exception of ad recall in durable good, female scores exceed males in all the dependent variables. Next, to formally test the hypotheses, we performed a multivariate analysis of variance (MANOVA) in all dependent variables. The two independent variables were gender and ad type. The results of the hypotheses testing are summarized in Table 6. The multivariate main effects for the independent variables were statistically significant for both independent variables, i.e., gender [Pillai's trace = .007, $F(4, 3{,}227) = 5.34$, $p < .001$] and ad type [Pillai's trace = .067, $F(4, 3{,}227) = 57.93$, $p < .001$].

H1 suggests that males will exhibit a stronger level of trust in advertising sent by mobile messaging. The

Table 6 MANOVA results.

Source	Multivariate test		Univariate tests[b]			
	df	F[a]	Trust in mobile advertising	Attitude toward the ad	Attitude toward the brand	Ad recall
Main effects						
Gender (G)	1	5.34***	7.18**	14.94***	10.51**	.59
Ad type (A)	1	57.93***	.39	1.19	118.30***	61.35***
Interactions						
G × A	1	3.41**	.29	.22	.33	9.31**
Error	3,230		1,874.47 (.58)	1,550.76 (.48)	2,094.66 (.65)	5,594.01 (1.73)

Multivariate F ratios were generated from Pillai's trace statistic. Values enclosed in parentheses represent mean square errors.
[a] Multivariate df = 4, 3,227
[b] Univariate df = 1, 3,230
*p < .05
**p < .01
***p < .001

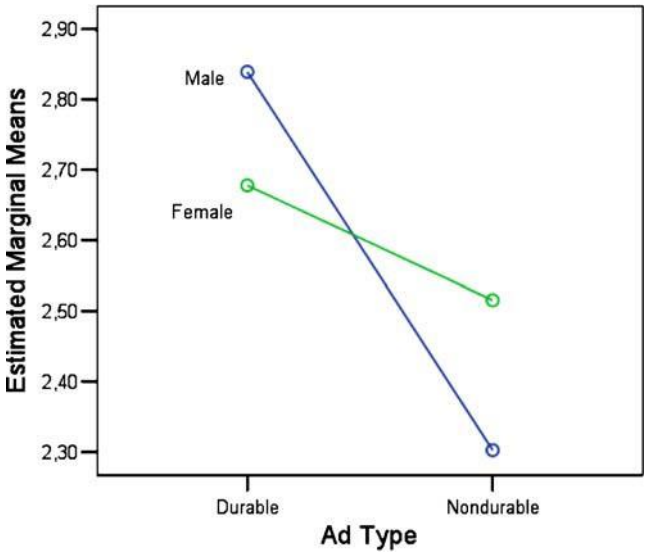

Fig. 1 Interaction effects of gender and ad type in ad recall.

univariate effects revealed that females trust in mobile advertising significantly more than males ($F=7.18$, $p<.01$). Thus, gender effects on trust in mobile advertising were contrary to the direction predicted. Therefore, H1 was rejected.

Next, H2 postulates that females will show a more favorable attitude toward the ad than males. Our data show that females liked the ad more than males did, and the difference was statistically significant ($F=14.94$, $p<.001$). This supports H2.

Similarly, H3 posits that attitude toward the advertised brand will be more favorable among females than males. The univariate F test resulted in highly significant gender effects ($F=10.51$, $p<.001$). Females liked the advertised brand more than males did. Thus, H3 was supported.

Multivariate F ratios were generated from Pillai's trace statistic. Values enclosed in parentheses represent mean square errors.
[a] Multivariate df=4, 3,226
[b] Univariate df=1, 3,234
*p<.05
**p<.01
***p<.001

H4 predicts that gender also affects the level of ad recall: Females will recall the ad better than males. The predictor score was slightly greater among female respondents than their male counterparts. However, the difference was statistically non-significant (F=.59, p=.44). Thus, H4 was not supported by our data.

H5 hypothesized that interaction effects would be found between gender and ad type on the dependent variables. The multivariate effect for this interaction was significant [Pillai's trace =.004, F(4, 3,227)=3.41, p<.01], and was accompanied with significant univariate effect only on ad recall [F(1, 3,230) =9.31, p<.01], which is also graphically identified in Fig. 1. Thus, H5 gained partial support from our data.

MANCOVA

Our RQ1 and 2 address the role of mobile Internet usage frequency as covariate of gender effects. To this end, multivariate analysis of covariance (MANCOVA) was performed. MANCOVA allows for the comparison of group means on a dependent variable after the group means have been adjusted on a covariate variable (Hair et al. 2006).

As shown in Table 7, the multivariate main effects for the independent variables were statistically significant for both independent variables, i.e., gender [Pillai's trace=.006, F(4, 3,226)=5.17, p<.001], and ad type [Pillai's trace=.066, F(4, 3,226)=57.04, p<.001]. In terms of RQ1, the MANCOVA
reveals the significant multivariate main effect of usage frequency [Pillai's trace=.142, F(4, 3,226)=133.55, p<.001], which was accompanied with significant univariate effects on all the dependent variables. The effect was especially strong on ad recall (F(1, 3,234)=365.34, p<.001).

Table 7 MANCOVA results.

Source	Multivariate test		Univariate tests[b]			
	df	F[a]	Trust in mobile advertising	Attitude toward the ad	Attitude toward the brand	Ad recall
Covariate						
Usage frequency	6	133.55***	219.54***	418.04***	36.17***	225.62***
Main effects						
Gender (G)	1	5.17***	6.43*	14.33***	10.01**	.31
Ad type (A)	1	57.04***	.03	.26	123.68***	58.05***
Interactions						
G x A	1	4.81**	2.13	.57	.04	16.57***
Error	3,229		1,755.14 (.54)	1,373.00 (.43)	2,071.45 (.64)	5,228.67 (1.62)

Multivariate F ratios were generated from Pillai's trace statistic. Values enclosed in parentheses represent mean square errors.
[a] Multivariate df=4, 3,226
[b] Univariate df=1, 3,234
*p<.05
**p<.01
***p<.001

In addressing RQ2, we controlled the effects of usage frequency to examine whether any significant changes occur. As Table 6 shows clearly, the statistical significance was unchanged, both for the main effects of each independent variable and for the interaction effects of the both. However, what is interesting here is the reduction of error. After controlling the covariate, the amount of the unexplained variance was reduced by 119.33, 177.76, 23.21, and 365.34, for trust in mobile advertising, attitude toward the ad, attitude toward the brand, and ad recall, respectively. Specifically, the reduction of error was notably high in ad recall, indicating that, although the gender effect is still non-significant, usage frequency is one of the important covariates affecting this dependent variable.

Limitations

For our findings to be more objective, two important limitations must be recognized. First and foremost, we used only two brands as stimuli, so any generalization from our findings must be treated with caution. Second, although the mobile-based survey method ensures that the respondents are real users of the mobile Internet, the heavy youth skew in the sample may be due to workers and students in their 20s being more likely than older respondents to take a survey. This point should be taken into account in interpreting the results of this study.

Discussion

Do gender effects appear in mobile advertising trust, attitude, and recall? Despite a recent proliferation of mobile Internet technology, as yet little research addresses this question. To address the question, we collected data from Japan, an Asian country that has experienced both high Internet penetration and advanced mobile communication technology. This enables us to make a stronger case that draws more generalizable implications.

First, our findings suggest that Japanese females are more likely than their male counterparts to perceive stronger trust in mobile advertising. This seems to be inconsistent with prior research that found that women are generally more skeptical than men of online shopping, perhaps due to an absence of the "essential emotional bond with the retailer" (Rodgers and Harris 2003). A possible interpretation of our seemingly contradictory results may be related to the general importance of trust in Japanese commerce. It has been argued that Japanese firms tend to establish trusting in-group-like relationships with consum- ers, and that their advertising focuses on mutual understandingand dependency, in the attempt to induce positive feelings rather than rational reasoning (Lazer et al. 1985).

Second, this tendency remains similar in attitude toward the ad and attitude toward the brand. This may indeed be indicative of women's general tendency in the use of email and other forms of computer-mediated communication. Women may be more receptive to mobile advertising because it gives them a timely topic for "talk." That is, they may use information from it to strengthen interper- sonal and interdependent relationships, by passing along the ads or simply emailing to inform their friends of what they have found in sales information. As we point out in the literature review, this may be because Japanese women need to establish stronger bonds among their friends, family, and associates, to protect themselves from a male- dominated society, and simultaneously give them collective power and confidence.

Managerially, however, some may argue that the raw difference in the dependent variables may be too small, and not substantial enough to justify more targeting of women. Specifically, the raw scores indicate that the mean values of ad recall were below the midpoint in both genders, suggesting that the majority of the respondents did not clearly remember the ad content. Nevertheless, this may become understandable when we take into account the estimate that the average Japanese i-mode user sends and receives as many as 20 messages per day (Ericsson 2004). In future, firms may want to expand creative executions in mobile advertising, for example, by including location- based links to contextualize the promoted information.

Third, when incorporating ad type as the second independent variable, the univariate effects became signifi- cant for ad recall, but non-significant for the remaining dependent variables. This significant interaction effect of gender and ad type indicates that female consumers' advertising recall in mobile medium may be somewhat selective, and especially dependent upon the type of product promoted. Although this takes us beyond the scope of the present study, our findings appear to indicate that, when targeting female consumers, it is more appropriate to use non-durable goods in mobile-based promotional campaigns. In fact, the industry has already reported a successful mobile campaign for clothing and cosmetics, which are relatively emotionally laden products, and thus more suitable for younger women (Senden Kaigi 2004). Given that the "parasite single" makes up part of the most influential market mavens in Japan (Okazaki 2004), this targeting strategy in particular makes sense in terms of both segment and product type.

Finally, the MANCOVA indicates that, although the usage frequency predicts significantly all the dependent variables as a covariate, the main effects of gender remain the same after controlling this covariate. However, it should for by the usage frequency. That is, after removing the effect of usage frequency, the gender differences persisted on all the dependent variables, except ad recall. This implies that Japanese women, regardless of frequent or infrequent usage, may recall an ad more clearly than their male counterparts. Given this finding, advertisers and marketers may want to develop a cross-mobile campaign to enable push type mobile ads to be cross-posted in mobile web sites, to strengthen recall.

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