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Lessons learned from i-mode: What makes consumers click wireless banner ads?

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Abstract

This paper attempts to propose a structural model that integrates various factors influencing attitude towards wireless banner ads and intention to access them. This model is applied to empirical data of Japanese mobile users sampled in the greater Tokyo area. First, structural equation modeling is used to test the baseline model. The results show that the model explains mobile users' perceptual antecedents and consequences well, with all structural paths statistically significant. Second, in the attempt to identify different mobile user groups, a probabilistic cluster analysis is performed. This results in three-cluster groups, consisting of (1) housewives and part-timers, (2) middle-aged white-collar workers and professionals, and (3) students and "parasite singles". Finally, multigroup analysis is used to examine whether the model operates invariantly across the three-cluster groups. The results indicate significant differences in the paths associated with consumer innovativeness and perceived entertainment between the groups. In closing, managerial implications and future research directions are discussed, while important limitations are recognised.

Keywords: Advertising; Consumer behaviour; i Mode; Innovation; Internet; Mobile device

1. Introduction

As providers of mobile handset services have expanded their subscriber bases, wireless communications have received increasing attention from both academics and

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practitioners. Ovum and Durlacher, of the London division of The Kelsey Group, project that wireless advertising revenues will reach between \$16 billion and \$23 billion by 2005 (MobileClick, 2002). A survey of 4260 European consumers who received wireless advertising revealed that as many as 64 percent responded at least once, either with a request for information or by making an outright purchase (Saunders, 2001). As a result, researchers have begun to pay attention to consumer adoption of the Wireless Application Protocol (WAP) in various contexts. WAP allows wireless users to retrieve or use Internet content, information systems, and mobile services via a small handheld device (Barnes, 2002; Bertel, Rangone, & Renga, 2002; Hung, Ku, & Chang, 2003; Koivumäki, 2002).

Wireless Internet platforms that allow the use of the emerging set of applications and services are now firmly established in Asian and Nordic countries (Sadeh, 2002). In 1999, the largest mobile operator in Japan, NTT DoCoMo, launched “i-mode”, which provides email and Internet access to more than 42 million subscribers (NTT DoCoMo, 2004e). The i-mode has metamorphosed into the world’s most popular mobile Internet service, and it offers a broad range of business contents through more than 83,000 linked sites, including financial transactions, ticket reservations, weather forecasts, banking, shopping, infotainment services, and directory services (Mizukoshi, Okino, & Tardy, 2001; NTT DoCoMo, 2004e). One of the most popular i-mode sites is “Tokusuru Menu” (“beneficial menu” in Japanese), which is an information site for paid publicity that features exclusively “beneficial” information, in the form of text banner ads (D2 Communications, 2002).

As services and applications through mobile telephony become increasingly differentiated and personalised, the acceptance of wireless advertising can be affected by various factors that contribute to the psychological beliefs and motives of mobile users. This study explores Japanese mobile users’ perceptions of wireless banner advertising on an i-mode platform, with three aims:

- (1) To identify the relationships among the constructs through structural equation modelling. A behavioural model of consumer acceptance of wireless advertising is suggested, on the basis of several constructs proposed as important: social information needs, consumer innovativeness, advertising awareness, perceived credibility, perceived informativeness, perceived entertainment, perceived irritation, attitude towards wireless ads, and intention to access.
- (2) To classify distinct mobile user groups by a probabilistic cluster analysis. To date, little attention has been paid to the issue of mobile user segmentation, and it is therefore important and necessary to profile basic user characteristics that differ in their demographic and psychographic dimensions.
- (3) To examine the clusters obtained in the second phase, using multigroup analysis, in order to establish whether the proposed model operates invariantly across distinct mobile user groups.

The remainder of the article attempts, first, to provide general industry background. It then develops the theoretical framework in detail, and establishes hypotheses and research questions. Next, it explains the methodological issues and provides results. The managerial implications are then discussed, and study conclusions are drawn from them. Finally, some important limitations are recognised and future research directions are suggested.

2. Background of the study

2.1. NTT DoCoMo's i-mode

In a broad sense, m-commerce can be defined as all activities associated with a potential commercial transaction by means of wireless Internet networks that interface with mobile devices (Tarasewich, 2002). More specifically, Sadeh (2002) characterises m-commerce as an emergent set of applications and services that consumers can access from their Internet-enabled mobile telephonic devices. This latter definition suggests that there are many dimensions to mobile commerce. Typically, m-commerce takes place in a strategic platform called a "mobile portal", where third-generation (3G) mobile communication systems offer high degrees of commonality of worldwide roaming capability, support for a wide variety of Internet and multimedia applications and services, and data transmission rates in excess of 144 kbps (Sadeh, 2002).

Along with the advance of WAP standard, the 3G systems enable these mobile portal operators to offer their customers diverse alternatives that are becoming increasingly differentiated and personalised. Such mobile portals take many forms, including NTT DoCoMo's i-mode portal, Nordea's WAP Solo portal, and Webraska's SmartZone platform. Hence, consumers' access to mobile portal services may be seen as an adoption of new information technology (IT). This adoption comprises factors contributing to the psychological beliefs and motives of m-commerce users.

Sadeh (2002) asserted that Japan's i-mode portal is to date the pre-eminent example of m-commerce gateway. By June 2004, the i-mode Japanese subscriber base had reached 43 million, and the European user base was expanding through partnerships with key mobile operators (NTT DoCoMo, 2004c). After E-Plus launched its i-mode subscription in Germany, NTT DoCoMo's capital partners set up the service in Belgium (KPN Orange), France (Bouygues Telecom), Taiwan (KG Telecommunications) and the Netherlands (KPN Mobile NB) in 2002; in Italy (WIND Telecomunicazioni) and Spain (Telefónica Móviles) in 2003; and in Australia (Telstra Corporation) and Greece (COSMOTE) in 2004 (NTT DoCoMo, 2003a, 2003b; NTT DoCoMo, 2004a, 2004b). By the end of June 2004, i-mode users outside Japan exceeded three million (NTT DoCoMo, 2004c). European users are said to spend an incremental 6–10 Euros (\$8–\$13) a month on i-mode services (Greenwood, 2004).

The uniqueness of i-mode lies in its PDC-P network, a packet-switched technology that offers always-on functionality. This allows users to keep their devices on but pay only for actual traffic (Sadeh, 2002). Furthermore, the i-mode manages a critical mass of numerous "official" content providers, who create official i-mode sites. Subscribers to i-mode can directly access these official sites through the "i-menu", and they can subscribe to optional additional information (Fig. 1).

2.2. Wireless advertising defined

As with wired Internet advertising, wireless advertising can be classified into two delivery categories: push-type ads and pull-type ads. Push-type ads are messages that are proactively sent out to wireless users and devices, as alerts, short message services (SMS), or even voice calls (Carat Interactive, 2002). In contrast, pull-type ads are messages served to users while they are navigating mobile portal sites or properties on WAP or i-mode. Pull-type ads are

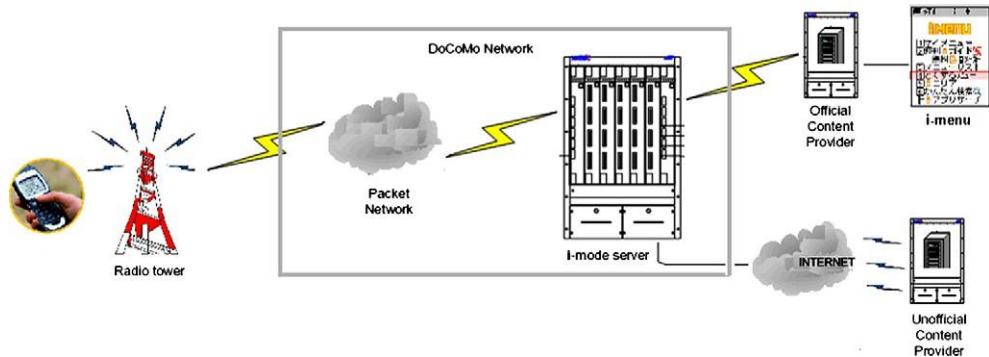


Fig. 1. Overview of i mode Internet service.

seen when a user requests specific information from a provider: an advertiser's message is displayed to the viewer in the same way as banner ads on the fixed Internet. However, users are generally conscious that viewing the advertiser's message is costing them airtime, and their spontaneous reaction is therefore key to judging whether it is worthwhile to access further the information (Carat Interactive, 2002).

A typical example of pull-type ads is "Tokusuru Menu", which is offered on the official i-mode menu. This platform is one of the most popular i-mode sites, and it provides text banner ads for promotional campaigns, discount coupons, presents, and other attractions (Fig. 2). As with the wired Internet, users click on banners to reach the advertiser's linked Web site. Any i-mode user can access the platform, and the optional subscription to it is free. Tokusuru Menu had over one million subscribers by 2003, and it attracted an average of 4.2 million people monthly (D2 Communications, 2003). The click-through and call-through rates are reported to be between 10 and 15 percent, which is notably higher than those of the regular wired Internet.

This wide acceptance of such a platform may be due in part to a cultural factor. One industry expert observed that "In Japan, most people are walking, not driving, which

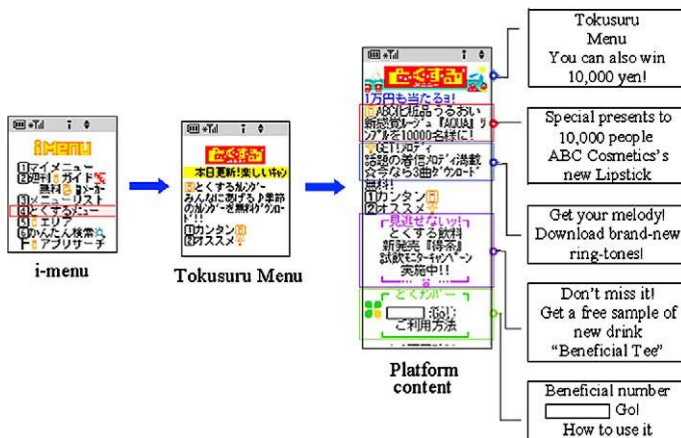


Fig. 2. Wireless advertising platform "Tokusuru Menu".

makes it easier to interface with the device” (MobileClick, 2002). Furthermore, public transportation systems are the primary method of commuting, and commuters have rapidly accepted the mobile portal as a means of making commuting time enjoyable (Baldi & Thaung, 2002). However, an industry survey indicates that those who access Tokusuru Menu while taking public transportation to go to work or school account for only 25.6 percent, while as many as 46.3 percent browse it at home (Sendenkaigi, 2003). Hence, the principal factors influencing consumers to “click” on text banner ads to access wireless sites remain largely unknown.

3. Theoretical framework

In developing a theory of wireless advertising acceptance, this study proposes two principal dimensions as antecedents of attitude towards wireless ads: media appraisals, and media uses and gratifications. First, media appraisals consist of social information needs, consumer innovativeness, and advertising awareness, which collectively address the influence of social and personal control factors, which the existing theories on computer-usage behaviour tend to exclude (Taylor & Todd, 1995). Second, media uses and gratifications are perceived entertainment, informativeness, and irritation. Mediated by one additional variable, perceived credibility, media uses and gratifications have a direct relationship with attitude towards wireless ads, which in turn affects intention to access.

3.1. Media appraisals

Consumers may acquire advertising information as part of a social information search in a variety of media. The experience and acquisition of desired information is usually motivated by various factors, because it relates to the processes to select, secure, use, and dispose of ideas to satisfy consumers’ basic needs (Hawkins, Best, & Coney, 2001). Ramirez et al. (2002) argue that consumers initiate their “information-seeking strategy” by conducting preliminary information appraisals, which lead to subsequent strategy selection. Here, “information-seeking strategy” refers to the way in which consumers pursue relevant information about a target. In the context of wireless advertising, such information-seeking parallels a process of media appraisals, which result in consumers “clicking” behaviour that brings in the desired content. This is essentially what Balasubramanian, Peterson, and Jarvenpaa (2002) call “receiver-initiated acquisition of information” in a taxonomy of m-commerce.

Social information needs refers to a level of goal-oriented interest in topics, events or problems associated with consumers’ social identity (Ramirez et al., 2002). A greater level of this construct yields a greater level of advertising awareness, which can be defined as the extent to which consumers consciously view advertising messages in a variety of media, such as television, radio, magazine or Internet. A more frequent contact with advertising messages leads to a more positive attitude towards wireless ads.

Consumer innovativeness refers to a general tendency to search, collect, and distribute novel or original experience ahead of the times (Agarwal & Prasad, 1997; Im, Bayus, & Mason, 2003). Social information needs presuppose such a risk-taking propensity, and this fosters a greater level of advertising awareness. Furthermore, the acceptance of wireless advertising may be directly enhanced by the diffusion of such new ideas, in which “participants create and share information with one another in order to reach a mutual

understanding” (Rogers, 1995). An explicit relationship is therefore postulated from consumer innovativeness to intention to access wireless advertising. Taken together, we propose the following hypotheses:

- H1: Social information needs directly and positively influence consumer innovativeness. H2: Social information needs directly and positively influence advertising awareness. H3: Consumer innovativeness directly and positively influences advertising awareness. H4: Consumer innovativeness directly and positively influences intention to access. H5: Advertising awareness directly and positively influences attitude towards wireless ads.

3.2. Media uses and gratifications

This second dimension is based on the well-established media uses and gratifications paradigm, which was originally developed by communications researchers to understand consumers’ motivations to use different media (Brackett & Carr, 2001; Ducoffe, 1996; Dholakia, Bagozzi, & Pearo, 2004; Flanagin & Metzger, 2001; Lin, 1999). This theory explains why individuals often seek out media in a goal-setting fashion to fulfil a core set of motivations. The behaviour of fixed Internet users has been studied using this theoretical framework, focusing on online consumers’ needs or motivations (Lin, 1999; Luo, 2002). Thus, it can also clarify wireless advertising adoption. Our model is built partially upon Ducoffe’s (1996) model. This examined attitude towards web advertising using three perceptual antecedents: entertainment, informativeness, and irritation.

In a recent study on mobile emailing, five gratifications were identified: “reassurance”, “sociability”, “immediate access/availability”, “instrumentality” and “entertainment/enjoyment” (Höflich & Rössler, 2001). On this basis, entertainment seems to play a central role in wireless advertising adoption, because it derives from fun and relaxation in browsing, playing and discovering different information displayed in mobile handsets. In other words, perceived entertainment can be considered positively associated with attitude towards wireless ads. Thus, we posit the following hypothesis:

- H6: Perceived entertainment directly and positively influences attitude towards wireless ads.

The informational value of virtual community has been described as “one that the participant derives from getting and sharing information in the virtual community, and from knowing what (presumably credible) others think” (Dholakia et al., 2004). People tend to browse using mobile phones because they need information in the right time at the right place. In particular, consumers may use mobile information search while selecting products at stores or while window-shopping, in order to make or modify their purchasing decision. Thus, perceived information seems to be linked with both attitude towards wireless ads and intention to access. This advances the following hypotheses:

- H7: Perceived informativeness directly and positively influences perceived credibility. H8: Perceived informativeness directly and positively influences attitude towards wireless ads.

Positive motives enhance consumers' media selection, while negative motives lead to the contrary. Perceived irritation has been recognised as an influential factor in uses and gratifications studies of wired Internet usage: unsolicited, confusing information tends to annoy consumers. Consumers face a psychological dilemma, in that accessing information may impose airtime and associated costs, but message content may be of real value. This is also the case with mobile communications. Consumers often feel disappointed with themselves when they are not capable of managing complex mobile devices to achieve their information needs. In addition, an implicit frustration may arise because of their potential loss of control over personal information, which can be disseminated without their knowledge or permission (Featherman & Pavlou, 2002; Luo, 2002). This is relevant to this study, because users of mobile communications are often forced to spend time and money wastefully. Therefore, it is posited that perceived irritation has a negative influence not only on attitude towards wireless ads, but also on intention to access. More formally:

H9: Perceived irritation directly and negatively influences perceived credibility.

H10: Perceived irritation directly and negatively influences attitude towards wireless ads.

3.3. Perceived credibility

Traditionally, the relevance and the credibility of ads have been considered important mediators of advertising effects (Andersson & Nilsson, 2000). In particular, perceived credibility can be seen as consumers' feedback, as the way in which individuals determine whether the information is true or false. Credibility becomes crucial when consumers must make decisions or take action on the basis of uncertain information. On the Internet, however, it is more difficult to distinguish between more credible and less credible sources because, as is not the case with traditional media, much of the content of online information is not subject to governmental or ethical regulation (Eastin, 2001). This unregulated flow of information presents a similar problem for those seeking information via mobile devices. In extending Ducoffe's (1996) model, Brackett and Carr (2001) added this construct to the antecedent variables of attitude towards web advertising, and found empirical evidence of the association.

In this vein, Sadeh (2002) points out that the success factors associated with the i-mode m-commerce portal are precursors of future Internet business models, in which value will be created through convenience, ease of use, and compelling content that users will be willing to pay for. Mobile users are likely to choose to view wireless advertising platforms out of curiosity, but they must then decide whether to further access promotional sites. Such a decision must be made mainly on the basis of the credibility of advertisers, and of advertisements. Therefore, perceived credibility is directly related to users' choice to "click" on text banner ads to access promotional sites: they are likely to do so only when they perceive the content to be non-deceptive. Thus, the following hypotheses are suggested:

H11: Perceived credibility directly and positively influences attitude towards wireless ads.

H12: Perceived credibility directly and positively influences intention to access.

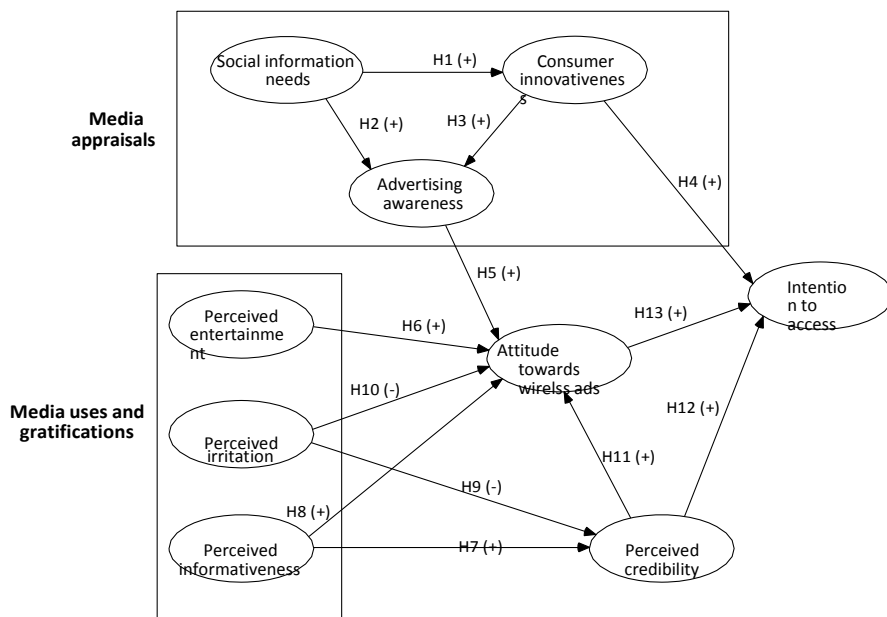


Fig. 3. Proposed baseline model.

3.4. Attitude formation and behavioural intention

An attitude towards an object can be defined as an individual's internal evaluation of the object, on the basis of his or her beliefs (Fishbein & Ajzen, 1975). In other words, beliefs determine the basic form of the attitude, which in turn triggers behavioural intentions (Davis, 1993). Therefore, exposure to an advertising message, for a specific product, first influences one's beliefs, which then mediate the attitude towards the product. Subsequently, behavioural intention is formed as a consequence of this attitude formation (Fishbein & Ajzen, 1975).

A wireless advertising platform can be seen as a marketing stimulus in an interaction, between an advertiser and a consumer, that is mediated by a mobile handset. The level of exposure to mobile devices varies according to consumers' needs and wants, but it is likely that they have formed favourable or unfavourable attitudes, irrespective of their actual usage (Lu, Yu, Liu, & Yao, 2003). When consumers form positive attitudes towards wireless ads, they are more likely to demonstrate their intention to access the sites that provide benefits. Thus:

H13: Attitude towards wireless ads directly and positively influences intention to access. The

baseline model, with the proposed hypotheses, is shown in Fig. 3.

4. Mobile user characteristics

The preceding discussion provides an overview of the proposed constructs that we use to explain how consumers formulate attitude towards wireless advertising and the behav-

journal intention to access it. However, different mobile user groups may perceive these constructs differently, because, in general, markets consist of a number of segments, each of which is made up of natural groupings of customers. Consumers can be split into different segments or “clusters”, within each of which customers have similar characteristics and similar needs. To this end, this study attempts to classify mobile users in terms of demographic and psychographic characteristics.

Demographic profiling involves the process of splitting the market, on the basis of the similarities and differences of the sample, in terms of gender, age, marital status, occupation, monthly allowance, and household structure. These descriptive attributes have been used in most industry surveys, many of which suggest that the likelihood of adopting mobile IT innovations seems to depend largely upon age, gender, occupation and income, while the association between mobile adoption and life-style variables remains uncertain. Industry surveys tend to focus on descriptive characteristics, and provide little diagnostic information about mobile adopters. However, segments with similar demographic data may also be differentiated by their psychographics: in particular, by media usage habits in Internet, mobile, and other traditional media.

On this base, the following research questions are formulated:

RQ1: How many clusters exist among the mobile users examined in this study? What differences, if any, are there among the clusters in terms of demographics and media usage habits?

RQ2: Does the baseline model fit well each of the clusters obtained in RQ1? Does it support the hypothesised structural paths established previously? Does it operate equivalently across the distinct mobile user groups?

5. Methodology

This study was part of a large omnibus research project conducted by a Japanese advertising foundation. A multi-stage probabilistic sampling was conducted in the greater Tokyo Metropolitan District, on the basis of (1) proportionate stratified sampling according to age and gender distribution of the general population, and (2) randomly chosen location.

The study used the drop-off/pick-up fieldwork technique to collect the data. In this technique, a structured questionnaire was individually left at a chosen residence, with the purpose of the survey being explained, face-to-face, to an adult in the household by a member of the research team. Then, one week later, the same researcher returned to the residence to collect the completed questionnaire. An overall response rate of approximately 48.4%, and a total of 786 usable responses was collected.

Prior to main analysis, an initial data screening was performed: (1) only consumers who regularly use mobile device were chosen; (2) questionnaires with missing values were removed. As a result, 612 respondents were retained. Then, after the evaluation of basic assumptions, six univariate outliers were deleted. There was no extreme univariate outlier. Therefore, 606 responses were used in the data analysis.

The survey instrument had three parts: face questions, common questions, and specific questions. The face questions cover standard demographics, such as gender, occupation, marital status, and monthly allowance, among others. The common questions relate to general perceptions on advertising, media usage habits (in Internet, mobile, and other

traditional media), social information needs, consumer innovativeness, and so forth. The specific questions address a series of perceptions on wireless advertising platforms. None of the questions allowed multiple responses. The question items used in this study are shown in the [Appendix](#).

To make the questions clearer, photographic images of i-mode's "Tokusuru Menu" were inserted in the questionnaire. This was chosen as a research stimulus because it has been asserted that i-mode is the most successful example of m-commerce today ([Sadeh, 2002](#)). Thus, it can be considered an important example that can be used as a bridge between theoretical exploration and the reality of mobile communications. Here, this stimulus is used to represent overall feelings about wireless banner ads, not about the specific product advertised. The respondents were not asked to actually connect their mobile device to the "Tokusuru Menu". Instead, photographic images were provided and respondents were asked for their perceptions.

To address the hypotheses and research questions, a three-phase analysis was designed. Phase 1: thirteen hypotheses are tested by a structural equation modelling on the proposed baseline model; Phase 2: Research question 1 is addressed with a probabilistic cluster analysis; and Phase 3: Research question 2 is answered with multigroup analysis based on the clusters obtained in Phase 2.

6. Results

6.1. Phase 1: Hypotheses testing

In Phase 1, the baseline model was tested using structural equation modelling via AMOS 5.0. Before conducting the analysis, an initial examination of the correlation matrix was performed. ([Table 1](#)).

Table 1
Correlations among constructs

	1	2	3	4	5	6	7	8	9
1. Social information needs	1								
2. Consumer innovativeness	.279**	1							
3. Advertising awareness	.241**	.562**	1						
4. Perceived credibility	.010	.108**	.131**	1					
5. Perceived informativeness	.029	.138**	.183**	.775**	1				
6. Perceived entertainment	.019	.135**	.228**	.689**	.812**	1			
7. Perceived irritation	.027	.046	.093*	.422**	.431**	.479**	1		
8. Attitude towards wireless ads	.013	.037	.093*	.580**	.613**	.633**	.505**	1	
9. Intention to access	.010	.260**	.232**	.556**	.553**	.610**	.412**	.606**	1

* Significant at the $p < .05$ level.

** Significant at the $p < .01$ level.

To examine the direct links between the constructs depicted in our baseline model, we followed the two-step approach of Anderson and Gerbing (1988). In this approach, the estimation of a confirmatory factor analysis precedes the simultaneous estimation of the measurement and structural models. A confirmatory factor analysis was built with 9 latent constructs and a total of 37 variables (AMOS 5.0). To take into account the recommendations of such authors as Bagozzi and Yi (1988) and Bollen (1989), multiple indexes were used to assess the goodness-of-fit of the overall model: the Satorra Bentler χ^2 statistic, the comparative fit index (CFI), and the Tucker Lewis index (TLI), and the standardised root mean squared error of approximation (RMSEA).

In a model with “good” fit, the χ^2 statistic should not be significant at the 5 percent level and the values of the CFI and TLI indexes should be close to 1, although values between 0.90 and 0.95 are considered adequate (Bagozzi & Yi, 1988; Bollen, 1989). The RMSEA index should be close to zero (Byrne, 2001). The results showed that all items exhibited high standardised loadings on their intended factors with a good fit (CFI .95; TLI .94; RMSEA .049). Thus, a good convergent validity was confirmed.

Next, the measurement of each construct was assessed for unidimensionality and reliability using three different approaches: Cronbach’s alphas, variance extracted, and composite reliability (Table 2). With regard to Cronbach’s alpha, the scores ranged from .67 to .95. A possible reason for the high alphas and for the exception is that many of the high-scoring measures were adopted from the existing literature, whereas the remaining measure was newly conceptualised. Given the recommended minimum level of .60 for an exploratory study, all the constructs were deemed to be reliable. Scores exceeded the levels recommended by Hair, Anderson, Tatham, and Black (1998). The composite reliability estimates the extent to which a set of latent construct indicators share in their measurement of a construct, whilst the average variance extracted is the amount of common variance among latent construct indicators (Hair et al., 1998). Both scores exceeded .70, which is considered supportive of acceptable internal consistency. Thus, the reliability, which is indicative of unidimensionality, is established (Hair et al., 1998).

The structural paths on the hypothesised relationships between the proposed constructs were examined with maximum likelihood method (AMOS 5.0). Most of the indexes indicate an adequate model fit, with the exception of the χ^2 statistic. Testing yielded a χ^2 value

Table 2
Reliability analysis for the proposed constructs

Constructs	Items	Mean	SD	α	Variance extracted	Composite reliability
Social information needs	7	3.40	.27	.73	.79	.96
Advertising awareness	5	3.22	.68	.68	.80	.95
Consumer innovativeness	5	3.34	.50	.67	.72	.93
Perceived credibility	5	3.05	.12	.95	.97	.99
Perceived informativeness	3	3.06	.13	.93	.97	.99
Perceived entertainment	3	2.89	.25	.93	.97	.99
Perceived irritation	3	4.49	.22	.84	.96	.99
Attitude towards wireless ads	4	3.39	.13	.93	.96	.99
Intention to click	2	3.16	.08	.91	.98	.99

Note. The composite reliability and variance extracted were computed separately for each multiple indicator construct using the data obtained from the confirmatory factor analysis. The formulas were adopted from Hair et al. (1998).

of 1498.49 with 607 degrees of freedom and a probability of less than .001. This suggests that the fit of the data to the hypothesised model is not entirely adequate. However, it has been widely pointed out that the χ^2 statistic tends to be substantial when the sample size is large (Jöreskog & Sörbom, 1993). In addition, the difficulty of passing this stringent test has been noted elsewhere (Bollen, 1989). Therefore, it was judged that the multiple indexes sufficiently justify the adequacy of the model's fit to the sample data (Byrne, 2001). The results of hypotheses testing, along with fit indexes, are summarised in Table 3. Ten out of twelve hypotheses were supported by our empirical data.

In terms of media appraisals, our basic propositions gained support. As proposed in Hypothesis 1, the path from social information needs to consumer innovativeness was significant: the more involved consumers are in social activities, the more likely they are to adopt innovative behaviour in terms of searching new information. The effect size shows a moderate level of association between the constructs. Likewise, in line with Hypothesis 2, social information needs were directly and positively related to advertising awareness (p .035). Regarding Hypothesis 3, the effect estimate for the path from consumer innovativeness to advertising awareness was significant, suggesting that, the more innovative consumers are, the more conscious they are of advertising messages. The effect size was the second strongest amongst the hypothesised paths (standardised coefficient .696). Also, consumer innovativeness was indeed a determinant of intention to access, as posited in Hypothesis 4. Surprisingly, however, advertising awareness was found to be a negative effect on attitude towards wireless ads. This finding was contrary to Hypothesis 5, which posits the direct and positive structural path.

As for media uses and gratifications, we found, consistent with Hypothesis 6, a significant effect of perceived entertainment on consumers' attitude towards wireless ads. With regard to perceived informativeness, the results were mixed: the effect on perceived credibility was statistically significant, but the effect on attitude towards wireless ads was not. These results lend support to Hypothesis 7 but not to Hypothesis 8, respectively. The strength of the effect estimate in Hypothesis 7 was noteworthy: standardised coefficient of .761, which was the strongest among the paths we examined in the model. Consistent with Hypotheses 9 and 10, two negative effects were found in the two paths from perceived irritation: to perceived credibility, and to attitude towards wireless ads, respectively. Thus, this construct not only encourages consumers to doubt the trustworthiness of wireless advertising, but also to nourish a negative impression of it.

Consistent with Hypotheses 11 and 12, respectively, direct and positive effects of perceived credibility were observed both on attitude towards wireless ads, and on intention to access. Finally, our empirical data support Hypothesis 13, and suggest that attitude towards wireless ads significantly strengthens intention to access. In this respect, a clear and solid relationship was found between the constructs, with standardised coefficient of .466, which was the third strongest among the paths. Fig. 4 shows the revised baseline model.

6.2. Phase 2: Research question 1

In addressing Research question 1, TwoStep Cluster in SPSS 13, a statistical program, was used to cluster our data sets with mixed type attributes. This method is based on a distance measure that enables data with both categorical and continuous attributes to be clustered. This distance measure is derived from a probabilistic model in which the

Table 3
Summary of hypotheses testing

Hypotheses (expected direction)	Effect estimate	Standard error	Critical ratio	p	Results
H1: Social information needs ! consumer innovativeness(+)	.291	.069	4.441	***	Supported
H2: Social information needs ! advertising awareness(+)	.117	.064	2.113	.035	Supported
H3: Consumer innovativeness ! advertising awareness(+)	.696	.110	6.893	***	Supported
H4: Consumer innovativeness ! intention to access(+)	.261	.134	5.865	***	Supported
H5: Advertising awareness ! attitude towards wireless ads(+)	.070	.052	2.090	.037	Rejected
H6: Perceived entertainment ! attitude towards wireless ads(+)	.262	.050	4.496	***	Supported
H7: Perceived informativeness ! perceived credibility(+)	.761	.040	18.590	***	Supported
H8: Perceived informativeness ! attitude towards wireless ads(+)	.122	.059	1.619	.105	Rejected
H9: Perceived irritation ! perceived credibility()	.320	.028	7.695	***	Supported
H10: Perceived irritation ! attitude towards wireless ads()	.136	.027	4.117	***	Supported
H11: Perceived credibility ! attitude towards wireless ads(+)	.190	.050	3.071	.002	Supported
H12: Perceived credibility ! intention to access(+)	.302	.064	6.821	***	Supported
H13: Attitude towards wireless ads ! intention to access(+)	.466	.082	10.053	***	Supported

Fit indexes

χ^2 (degrees of freedom) = 1498.49 (607), $p < .001$

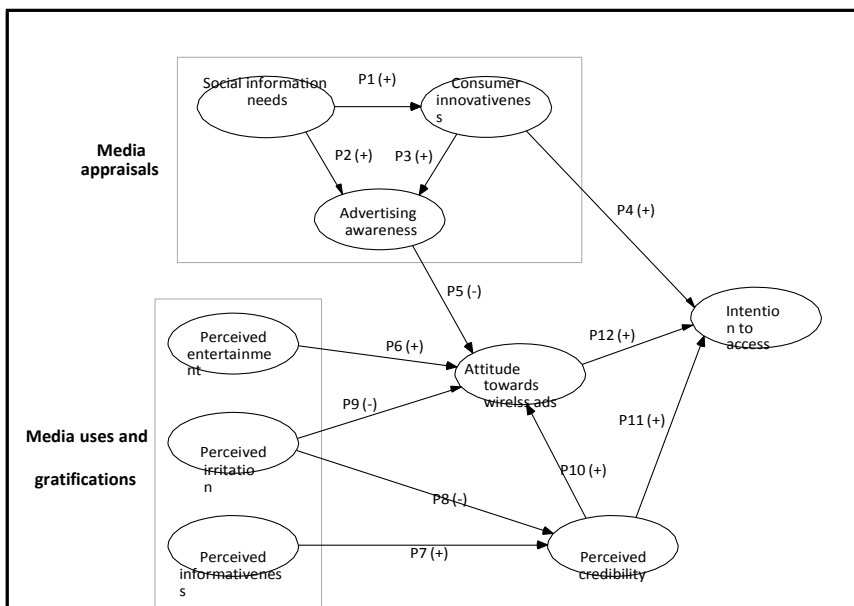
CFI (comparative fit index) = .94

TLI (Tucker Lewis index) = .94

RMSEA (root mean squared error of approximation) = .049

Note. The results of structural equation modelling are standardised maximum likelihood path coefficients for the hypothesised model. The critical ratio is defined as "Standardised estimates/Standard error", whose values larger than 1.64, 1.96 and 2.32, are statistically significant at the .10, .05 and .01 levels, respectively.

***Significant at the $p < .001$ level.



Structural paths (expected direction)		Effect estimat	Standar d	Critical ratio	p
P1: Social information needs	→ Consumer innovativeness (+)	.291	.069	4.441	***
P2: Social information needs	→ Advertising awareness (+)	.117	.064	2.110	.035
P3: Consumer innovativeness	→ Advertising awareness (+)	.696	.110	6.893	***
P4: Consumer innovativeness	→ Intention to access (+)	.261	.134	5.868	***
P5: Advertising awareness	→ Attitude towards wireless ads (-)	-.069	.052	-2.077	.038
P6: Perceived entertainment	→ Attitude towards wireless ads (+)	.317	.040	6.668	***
P7: Perceived informativeness	→ Perceived credibility	-.133	.027	-4.037	***
P8: Perceived irritation	→ Perceived credibility (-)	.763	.040	18.635	***
P9: Perceived irritation	→ Attitude towards wireless ads (-)	-.315	.028	-7.599	***
P10: Perceived credibility	→ Attitude towards wireless ads (+)	.259	.037	5.624	***
P11: Perceived credibility	→ Intention to access (+)	.302	.064	6.801	***
P12: Attitude towards wireless ads	→ Intention to access (+)	.464	.082	9.999	***

Fit indexes

Chi-square (degrees of freedom) = 1501.23 (608), $p < .001$ CFI

(comparative fit index) = .94

TLI (Tucker-Lewis index) = .94

RMSEA (root mean squared error of approximation) = .049

Note: The results of structural equation modelling are standardised maximum likelihood path coefficients for the hypothesised model. The critical ratio is defined as "Standardised estimates/Standard error", whose values larger than 1.64, 1.96 and 2.32, are statistically significant at the .10, .05 and .01 levels, respectively.

*** Significant at the $p < .001$ level.

Fig. 4. Revised baseline model.

distance between two clusters is equivalent to the decrease in log-likelihood function as a result of merging (Chiu, Fang, Chen, Wang, & Jeris, 2001).

In the first step, original cases are first grouped into "preclusters" that are then used in place of the raw data in the hierarchical clustering. Based upon its similarity to existing

preclusters, each successive case is added to form a new precluster, using a likelihood distance measure as the similarity criterion. Cases are assigned to the precluster that maximises a log-likelihood function. In the second step, the preclusters are then grouped using the standard agglomerative clustering algorithm, producing a range of solutions, which is then reduced to the best number of clusters on the basis of Schwarz's Bayesian information criterion (BIC). The BIC is known as one of the most useful and objective selection criteria, because it essentially avoids the arbitrariness in traditional clustering techniques (Norusis, 2003). In addition, both background noise and outliers can be identified and screened out in the algorithm (Chiu et al., 2001).

The demographic and psychographic variables used in the cluster analysis are shown in Table 4. The first set of items consists of variables with nominal scales, including sex, marital status, occupation, household structure, fixed Internet usage and mobile email usage. The second set of items consists of variables with ordinal scales, such as age, monthly allowance, hours spent watching TV, hours listening to radio, hours reading newspaper, and number of subscribed magazines. In addition, questions regarding interpersonal relations are also included. The auto-clustering algorithm indicates that a four-cluster solution is the best model, because it minimises the BIC value and the change in the BIC between adjacent numbers of clusters.

The resulting Clusters 1, 2 and 3 contain 153, 224 and 229 cases, or 25.2%, 37% and 37.8%, respectively. Table 5 summarises the frequency distributions for some of the categorical variables, which correspond to the demographic characteristics of each cluster.

Cluster 1 consists mainly of married women in a variety of age groups, from their thirties to their sixties. None of the male respondents are included. This cluster represents two main occupational categories: housewives and part-timers. Specifically, all housewives and more than half of the part-time workers belong to this group. Their monthly allowance is relatively lower than that of the other clusters, and is likely to be less than 30,000 yen. Household structure consists mainly of a married couple or a married couple who live with their children.

By contrast, the majority of Cluster 2 consists of married male respondents, from their thirties to their sixties. In particular, a large part of the "pre-retirement" population in their sixties is concentrated in this cluster. Cluster members are likely to be corporate executives, managerial, administrative, freelance workers, or self-employed. Most managerial positions are included in this group. Consequently, they have a relatively high level of monthly disposable income.

Cluster 3 consists of very young generations. All respondents below 20 are included in this group, and in contrast to Clusters 1 and 2, almost all respondents are single. In terms of household structure, they are primarily unmarried in single households, but other types of household structure are included: married with children, extended family, and others. The most logical interpretation is that they represent teenage students and young workers, especially in their twenties and thirties, who still live with their parents. The gender distribution consists approximately equally of male and female respondents. All students belong to this group. However, it should be noted that a greater proportion of those who could afford expenses of more than 100,000 yen belong to this cluster. Also, clerical, administrative, and unemployed make up a substantial proportion of Cluster 3.

Table 6 shows the frequency distribution of fixed Internet usage and mobile emailing. With regard to the former, Cluster 3 is the most enthusiastic user of Internet and Cluster 1 is the least enthusiastic. This corroborates one general condition identified in prior research: young male users are the first Internet adopters. In addition, Cluster 2, consisting

Table 4
Variables used for the cluster analysis

Scale	Variables	Categories
Nominal	Sex	(1) Male; (2) Female
	Marital status	(1) Married; (2) Single
	Fixed internet usage	(1) I regularly use internet; (2) I do not use internet now but will use it in the future; (3) I do not use internet now and will not use it in the future
	Mobile emailing	(1) I regularly use mobile emailing; (2) I do not use mobile emailing now but will use it in the future; (3) I do not use mobile emailing now and will not use it in the future
	Occupation	(1) Executive; (2) Managerial; (3) Clerical; (4) Administrative staff; (5) Self employed; (6) Free lance professional; (7) Part time worker; (8) Housewife; (9) Student; (10); Unemployed; (11) Others
	Household structure	(1) Single; (2) Married couple; (3) Married couple and children; (4) Extended family; (5) Others
Ordinal	Age	(1) 15 19 years old; (2) 20 29 years old; (3) 30 39 years old; (4) 40 49 years old; (5) 50 59 years old; (6) 60 65 years old
	Monthly allowance	(1) Less than 10,000 yen; (2) 10,000 19,999; (3) 20,000 29,999; (4) 30,000 49,999; (5) 50,000 69,999; (6) 70,000 99,999; (7) 100,000 149,999; (8) More than 150,000; (9) Unknown
	Hours spent watching TV	(1) Hardly; (2) Less than 1 hour; (3) 1 2; (4) 2 3; (5) 3 4; (6) 4 5; (7) 5 6; (8) More than 6
	Hours spent listening to radio	(1) Hardly; (2) Less than 1 hour; (3) 1 2; (4) 2 3; (5) 3 4; (6) 4 5; (7) 5 6; (8) More than 6
	Hours spent reading newspaper	(1) Hardly; (2) Less than 1 hour; (3) 1 2; (4) 2 3; (5) 3 4; (6) 4 5; (7) 5 6; (8) More than 6
	Number of subscribed magazines	(1) 1; (2) 2; (3) 3 4; (4) 5 6; (5) 7 8; (6) 9 10; (7) More than 11
	Interpersonal relations	Semantic differential scale with a 5 point format: <ul style="list-style-type: none"> • My friends want me to listen to their problems • I am a very social person • I can usually make a crucial decision by myself • My friends say that my ideas and opinions are creative and original • I can usually reconcile different types of opinions <ul style="list-style-type: none"> • I usually try to transmit third party's information correctly • I usually take leadership in groups

Note. 100 JPY \diamond 0.942 USD \diamond 0.744 EUR.

Table 5
Demographic profiles across the clusters (%)

Categories	Cluster 1 (n = 153)	Cluster 2 (n=224)	Cluster 3 (n = 229)
Gender***			
Male	0.0	63.7	36.3
Female	55.6	4.7	39.6
Age***			
Below 20	0.0	0.0	100.0
20-29	10.0	8.8	81.2
30-39	33.5	39.0	27.4
40-49	38.3	53.3	8.4
50-59	31.4	63.7	4.9
60-65	25.8	74.2	0.0
Marital status***			
Married	41.7	56.1	2.2
Single	0.0	7.5	92.5
Occupational category***			
Executive	17.4	65.2	17.4
Managerial	0.0	97.8	2.2
Clerical	2.2	33.0	64.8
Administrative staff	0.0	61.6	38.4
Self-employed	10.2	83.7	6.1
Freelance professional	4.5	72.7	22.7
Part-time worker	57.3	3.1	39.6
Housewife	100.0	0.0	0.0
Student	0.0	0.0	100.0
Unemployed	0.0	46.2	53.8
Others	2.8	41.7	55.6
Monthly allowance***			
Less than 10,000 yen ^a	64.6	12.3	23.1
10,000-19,999	46.8	20.3	32.9
20,000-29,999	34.5	32.7	32.7
30,000-49,999	12.8	50.8	36.3
50,000-69,999	9.1	42.4	48.5
70,000-99,999	7.0	53.5	39.5
100,000-149,999	0.0	28.6	71.4
More than 150,000	10.0	20.0	70.0
Household structure***			
Single	4.8	23.8	71.4
Married couple	35.5	59.7	4.8
Married with children	30.6	36.4	33.1
Extended family	19.5	45.5	35.1
Others	6.2	16.9	76.9

Notes. The numbers indicate percentages that horizontally sum to 100 percent.

*** Significant at $p < .001$, using Pearson χ^2 . No cells have expected count less than 5, with an exception of "monthly allowance", in which 3 cells have expected count less than 5.

^a 100 JPY \approx 0.942 USD \approx 0.744 EUR.

mainly of middle-aged white-collar workers and freelance professionals, most clearly contains a large part with a strong intention to use the Internet in the future and another large part intending not to use it in the future. Interestingly, this tendency applies equally to the

Table 6

Internet usage and mobile emailing across the clusters (%)

Categories	Cluster 1 (n = 153)	Cluster 2 (n = 224)	Cluster 3 (n=229)
Internet usage***			
I habitually connect to the Internet	23.1	34.2	42.8
I do not connect to the Internet, but I will connect to it in the future	30.9	49.4	19.8
I do not connect to the Internet and I will not connect to it in the future	31.3	39.8	28.9
Mobile emailing***			
I habitually use mobile emailing	25.0	28.3	46.7
I do not use mobile emailing, but I will use it in the future	25.0	61.8	13.2
I do not use mobile emailing and I will not use it in the future	26.7	61.1	12.2

Notes. The numbers indicate percentages that horizontally sum to 100 percent.

*** Significant at $p < .001$, using Pearson χ^2 .

use of mobile emailing. There exist, however, two important exceptions: (1) there is more enthusiasm among younger generations; (2) both intention and rejection among older generations are stronger for the use of mobile emailing.

Although the number of clusters is objectively determined on the basis of the BIC, it remains essential to assess the stability of the cluster solution. To this end, a stepwise discriminant function analysis was performed with variables that were not employed in the cluster analysis (17 items). As a result, three significant discriminant functions were found, which explain 100% of total variance; and three centroids are clearly separated on the canonical discriminant functions plot. Furthermore, 56% of the cases in the sample are correctly classified into the four clusters; this result is substantially higher than the random chance rate, 26.5%. Thus, the results of the discriminant analysis satisfactorily validated the three-cluster solution obtained from the probabilistic cluster analysis.

6.3. Phase 3: Research question 2

On the basis of the clusters obtained in the analysis 2, the mean values of the proposed constructs were compared (Table 7). An initial overview via ANOVA indicates significant

Table 7

Mean values of the proposed constructs across the clusters

Constructs	Cluster 1 (n = 153)	Cluster 2 (n = 224)	Cluster 3 (n = 229)	F	p	Post hoc comparison
1. Social information needs	3.45	3.60	3.16	31.21	***	3 < 1 < 2
2. Consumer innovativeness	3.27	3.31	3.43	2.86	.059	n.a.
3. Advertising awareness	3.22	3.19	3.24	.28	.756	n.a.
4. Perceived credibility	2.89	3.04	3.17	2.26	.105	n.a.
5. Perceived informativeness	2.98	3.07	3.09	.43	.652	n.a.
6. Perceived entertainment	2.79	2.79	3.05	2.65	.071	n.a.
7. Perceived irritation	4.50	4.49	4.49	.00	.996	n.a.
8. Attitude towards wireless ads	3.32	3.34	3.52	1.95	.144	n.a.
9. Intention to access	2.91	2.95	3.54	9.13	***	1 < 3, 2 < 3

*** Significant at the $p < .001$ level.

differences in social information needs and intention to access at $p < .01$. A post hoc DMS comparison reveals that the members of Cluster 3 are the least socially involved, but most likely to exhibit their intention to access wireless advertising.

Next, individual estimations of the baseline model were carried out for each of the three-cluster groups. The hypothesised structural relationships were estimated with AMOS 5.0. Table 8 summarises the results. The fit indexes suggest a good fit for all three models. Nevertheless, not all the structural parameters were significant at $p < .05$.

By and large, three important patterns should be noted. First, P2 (from social information needs to advertising awareness) and P5 (from advertising awareness to attitude towards wireless ads) were insignificant in all three models. Second, P8 (from perceived irritation to perceived credibility) was insignificant only in the Cluster 2 model. Third, P10 (from perceived credibility to attitude towards wireless ads) was insignificant only in the Cluster 1 model. The remaining paths were significant in all three models.

Although some important differences were identified among the three clusters in terms of the individual estimations, the variance must be tested statistically. To this end, multigroup

Table 8
Individual estimations of the baseline models

Hypothesised paths	Cluster 1		Cluster 2		Cluster 3	
	Effect estimate	p	Effect estimate	p	Effect estimate	p
P1: Social information needs ! consumer innovativeness	.404	.006	.390	***	.268	.010
P2: Social information needs ! advertising awareness	.083	.485	.038	.677	.121	.180
P3: Consumer innovativeness ! advertising awareness	.679	***	.327	***	.714	***
P4: Consumer innovativeness ! intention to access	.379	***	.743	***	.133	.027
P5: Advertising awareness ! attitude towards wireless ads	.125	.080	.015	.788	.082	.099
P6: Perceived entertainment ! attitude towards wireless ads	.537	***	.298	***	.176	.014
P7: Perceived informativeness ! perceived credibility	.768	***	.762	***	.767	***
P8: Perceived irritation ! perceived credibility	.156	.013	.085	.127	.157	.002
P9: Perceived irritation ! attitude towards wireless ads	.292	***	.224	***	.429	***
P10: Perceived credibility ! attitude towards wireless ads	.038	.708	.364	***	.353	***
P11: Perceived credibility ! intention to access	.235	.002	.361	***	.271	***
P12: Attitude towards wireless ads ! intention to access	.488	***	.354	***	.546	***
	$\chi^2(608) = 871.24^{***}$		$\chi^2(608) = 1021.56^{***}$		$\chi^2(608) = 1089.74^{***}$	
	CFI = .93		CFI = .92		CFI = .92	
	TLI = .93		TLI = .92		TLI = .91	
	RMSEA = .053		RMSEA = .055		RMSEA = .059	

Note. The results of structural equation modelling are standardised maximum likelihood path coefficients for the hypothesised model.

*** Significant at the $p < .001$ level.

analyses were carried out (AMOS 5.0). Following Byrne (2001), the multigroup baseline model was estimated with three-cluster groups simultaneously, without placing any equality constraints on the hypothesised paths. Their fit indexes serve as initial comparison points in addressing whether the proposed structural relationships would hold in the same way across the three-cluster groups. The χ^2 value of the unconstrained model was 2982.8 ($p < .001$), with 1824 degrees of freedom. The other indexes indicate a good fit (CFI .92; TLI .91; RMSEA .033). Next, in the constrained model, equality constraints were specified on all the structural paths. The χ^2 value increased to 3025.9 with 1848 degrees of freedom (CFI .92; TLI .91; RMSEA .033). The difference in the χ^2 values between the constrained and unconstrained models was 43.1 with 24 degrees of freedom, which was statistically significant at $p < .01$. Given this evidence of non-invariance between the constrained and unconstrained models, we then proceeded to test for the invariances of each path, separately.

Table 9 summarises the comparison of χ^2 values between the unconstrained model and the “equal paths model”. In the second model, the value was constrained to be equal

Table 9
Multigroup analyses across the clusters

Path	Unconstrained model		Equal paths model		$\Delta\chi^2$	Ddf	p
	χ^2	df	χ^2	df			
P1	2982.8	1824	2983.9	1826	1.	2	n.s.
P2	2982.8	1824	2983.3	1826	.5	2	n.s.
P3	2982.8	1824	2987.2	1826	4.4	2	n.s.
P4	2982.8	1824	2993.6	1826	10.8	2	**
P5	2982.8	1824	2985.4	1826	2.6	2	n.s.
P6	2982.8	1824	2992.2	1826	9.4	2	**
P7	2982.8	1824	2982.9	1826	.	2	n.s.
P8	2982.8	1824	2983.9	1826	1.	2	n.s.
P9	2982.8	1824	2985.2	1826	2.4	2	n.s.
P10	2982.8	1824	2993.9	1826	11.1	2	**
P11	2982.8	1824	2984.4	1826	1.6	2	n.s.
P12	2982.8	1824	2987.9	1826	5.1	2	n.s.

** Significant at the $p < .01$ level; n.s. = non significant.

Table 10
Pair wise analyses

Pair	Path	Unconstrained model		Equal paths model		$\Delta\chi^2$	Ddf	p
		χ^2	df	χ^2	df			
Clusters 1 and 2	P4	1893.0	1216	1893.0	1217	0.0	1	n.s.
	P6	1893.0	1216	1904.7	1218	11.7	2	**
Clusters 1 and 3	P4	1961.2	1216	1968.6	1217	7.4	1	**
	P6	1961.2	1216	1970.5	1218	9.3	2	**
Clusters 2 and 3	P4	2111.3	1216	2119.2	1217	7.9	1	**
	P6	2111.3	1216	2114.9	1218	3.6	2	n.s.
	P10	2111.3	1216	2111.9	1218	.6	2	n.s.

*** Significant at the $p < .001$ level; ** Significant at the $p < .01$ level; * Significant at the $p < .05$ level; n.s. = non significant.

across the three-cluster groups. The differences in χ^2 values and degrees of freedom between the two models provide a test of the equality of the path. Three out of the twelve paths were statistically unequal across the cluster groups: (1) P4 (from consumer innovativeness to intention to access); (2) P6 (from perceived entertainment to attitude towards wireless ads); and (3) P10 (from perceived credibility to attitude towards wireless ads).

As in Table 10, pair-wise comparison found that P4 is statistically greater for Cluster 2 than for Cluster 1 and Cluster 3. Similarly, P6 is significantly greater for Cluster 1 than for Cluster 2 and Cluster 3. For P10, there was no significant difference between Cluster 2 and Cluster 3, while the comparison between Cluster 1 and Cluster 2 or 3 is meaningless because this path was insignificant in Cluster 1.

On this basis, we now attempt to provide interpretations and implications of the findings in the following section.

7. Discussion

First, a structural equation modelling in Phase 1 supports the basic propositions of the baseline model, in that media appraisals and media uses and gratifications comprise, at least, two of the most important dimensions influencing consumers' decision to click on wireless banner ads. For media appraisals, the path from consumer innovativeness to advertising awareness was found to be particularly strong. Consumer innovativeness exhibits a modest but clear effect on intention to access. In addition, this effect was significant in all the independent estimations of the three-cluster groups.

On the other hand, it is surprising that perceived information was not significantly associated with attitude towards wireless ads. In the light of prior research, this is perhaps the most important discrepancy between the wired and wireless Internet gratifications. The other two gratifiers, perceived entertainment and irritation, were significantly related to attitude towards wireless ads in a positive and negative direction, respectively. Nevertheless, the path from perceived informativeness to perceived credibility was found to be the strongest in the model. That is, despite the insignificance of the direct effect on attitude towards wireless ads, the perception of informativeness acts as a strong driving force of its credibility, which in turn moderates attitude towards wireless ads.

One interesting and important finding is on the structural path from advertising awareness to attitude towards wireless ads: there is a negative relationship between the two constructs. However, this advertising awareness was in fact associated with the degree of attention paid to alternative media, such as television, radio, magazine, and wired Internet. Therefore, the most logical interpretation of this finding is that there may exist some "media switching" behaviour among mobile users. As the Video Research survey indicates, mobile users habitually access Tokusuru Menu at home, rather than outside (Sendenkai, 2003). Furthermore, this study found that its subscribers are often engaged in media "zapping" behaviour, indicating that their contact with traditional media is becoming more and more superficial. This has a practical implication for practitioners, in that an effective use of media mix could increase the total awareness of advertising campaigns. More importantly, this media mix strategy should be conceptualised and executed in a context of integrated marketing communications, where the weight of media impression should be planned for various communications functions, rather than having them operate autonomously. Such coordination would lead to synergy among promotional tools, and thus, more effective marketing communications programs.

Second, a probabilistic cluster analysis in Phase 2 suggests that our mobile users can be classified into three segments, in terms of their demographics and life-styles. Cluster 1: housewives and female part-timers; Cluster 2: middle-aged male managerial, administrative, freelance, and self-employed workers; and Cluster 3: students and young office workers. By and large, the findings of this study improve our understanding of strategic segmentations in mobile usage. While sporadic industry surveys had reported that young affluent males are the main adopters of mobile Internet, this study clearly demonstrates that this younger segment in Cluster 3 actually consists of two different groups: students, and young, unmarried office workers. Furthermore, Cluster 3 exhibits greater usage of mobile emailing as well as of wired Internet, which is indicative of wireless Internet connection. Hence, this segment corroborates the view that the current growth of mobile Internet owes much to young unmarried women, typically in their twenties, who live with their parents rent-free, so as to have their entire salary for spending money. Sociologists have coined a new phrase, “parasite singles”, to describe this group, and warn that it may become a serious social concern (Tolbert, 2000). From a marketing perspective, however, this group may be the market maven, actively cultivating mobile Internet adoption (and perhaps transactions also) with their high spending power.

On the other hand, the mobile Internet service was not taken up by Cluster 2, which represents business and professional users in their thirties and forties, who had been expected to be the most enthusiastic adopters (Mizukoshi et al., 2001). This may be a warning signal for mobile operators and content providers, because it suggests that the created content is putting off the most profitable segments, which may include highly skilled professionals, such as architects, accountants, and medical doctors. More than half of Cluster 2 currently uses neither wired Internet nor mobile emailing, and exhibits a high level of both intention and reluctance. However, an individual estimation indicates that the path from perceived irritation to attitude towards wireless ads was insignificant only for this cluster. All these contradictions suggest that this middle-aged white-collar segment may be largely unaware of the availability and importance of wireless advertising platforms. It is therefore important for wireless marketers and advertisers to examine, analyse, and understand why this segment perceives the mobile Internet service so confusingly.

Third, in relation to the preceding argument, the individual estimations in Phase 3 demonstrate that there exist significance differences in both perceptual and attitudinal aspects among the three-cluster groups. Furthermore, the test of invariance indicates that the causal structure is the same across the three-cluster groups, except for three paths: P4 (from consumer innovativeness to intention to access), P6 (from perceived entertainment to attitude towards wireless ads), and P10 (from perceived credibility to attitude towards wireless ads). Since P10 was statistically insignificant in Cluster 1 and indistinct between Cluster 2 and Cluster 3, most attention should be paid to P4 and P6.

The effect of P4 (from consumer innovativeness to intention to access) was strongest in Cluster 2, and weakest in Cluster 3. This can be interpreted to mean that, for middle-aged white-collar workers, accessing wireless advertising is synonymous with innovative behaviour, as is obviously not the case for younger generations. This is in contrast to P3 (from consumer innovativeness to advertising awareness), where Cluster 2 shows a weaker effect. Here, searching for new information is not a primary motive to read or watch traditional advertising for middle-aged white-collar workers, who read newspapers and magazines every day in public transportation. The weakness of P4 in Cluster 3 corroborates our

previous argument on “media zapping”, in that younger generations may be switching from traditional media to the wireless medium, as the most important form of information search. That is, while they pay less attention to traditional advertising, they are actively engaged in seeking information via mobile communications.

The effect of P6 was statistically greater in Cluster 1 than in Cluster 2 and Cluster 3, suggesting that fun and relaxation is a primary motive for housewives to positively perceive wireless advertising. This is consistent with P5 (from advertising awareness to attitude towards wireless ads) and P10, both of which were insignificant in Cluster 1. That is, for housewives, information delivered via a mobile device is perceived neither as an alternative channel, nor as a credible source of advertising in the traditional sense. This effect was minimum in Cluster 3, probably because the younger generations use mobile device not only for entertainment, but also for more diverse motives.

Finally, although this study addressed only pull-type advertising, it provides some important implications for push-type advertising. As problems associated with “spam” (unwanted email) on the wired Internet become a serious legislative concern (Petty, 2003), pull-type advertising platforms can be seen as a more realistic scenario for the future. Given a general failure of direct email marketing, companies should concentrate resources on establishing an effective mobile platform, which could attract “media zapping” consumers. In this vein, direct email marketers and advertisers should contemplate a way to convert unwanted email into an enjoyable subscription to an informative and entertaining mobile platform. Given appropriate “opt-in” functions, for example, as many as 71% of i-mode users receive an email newsletter (Scuka, 2002). Such coordination of various mobile options will be increasingly important, especially following the introduction of a revolutionary mobile wallet service, FeliCa, in July 2004 (NTT DoCoMo, 2004d). In a rising wave of mobile-based electronic commerce, this service will provide a practical solution that allows consumers to receive and redeem various forms of coupons or discounts via mobile handsets. Such a technological breakthrough further obliges marketers and advertisers to coordinate existing mobile communication tools. In this light, success depends largely on the previously emphasised function: the effective and efficient execution of integrated marketing communications.

8. Limitations and future research directions

To make the above discussion more objective, several important limitations should be recognised. First, this study dealt only with pull-type ads by using Tokusuru Menu as a research stimulus. Therefore, while some implications for push-type ads were provided in the preceding section, any conclusions or generalisations derived from this research should be confined only to pull-type banner ads, and exclude push-type ads.

Second, while the structural equation modelling successfully demonstrates the validity and reliability of both the measurement and structural models, the issue of discriminant validity remains unclear. In particular, a high level of correlation was found between perceived informativeness and perceived entertainment in both the initial correlation matrix and the exploratory factor analysis. However, in conducting the confirmatory factor analysis, the researcher decided to treat them separately, by focusing on the strengths of the regression paths from each construct to the observed variables. Nevertheless, a modest

level of cross-loadings was observed between the two constructs. This issue should be re-examined in any future study.

Second, this study adopted some of its research instruments from existing studies of the wired Internet. Future research should focus on differences, rather than similarities, between wired and wireless online behaviours, by incorporating more constructs relevant to the ubiquitous nature of mobile communications.

Finally, this study is essentially a pilot or feasibility test based on a limited sample size. Although this study employed a multi-stage probabilistic sampling, the respondents were chosen only in the greater Tokyo area. Therefore, the results from this study are not generalisable to, nor representative of the entire population.

9. Conclusions

This study attempts to examine the factors influencing consumers' attitude towards and intention to access wireless banner advertising. Unlike the majority of mobile commerce adoption research (which is usually based on the technology acceptance model or the theory of reasoned action), this study offers an alternative methodology that extends consumer behaviour theory on decision-making process. In addition, a "real-world" example, i.e., the paid publicity platform on the i-mode portal, with non-student random samples, makes this study unique in the existing literature. As Davis (1993) recommends, general survey research is usually the most desirable approach for studying decisions among individuals. However, although some excellent conceptualisations exist (e.g., Barnes, 2002; Lu et al., 2003; Siau & Shen, 2003), until now there has been little empirical knowledge of m-commerce adoption (e.g., Hung et al., 2003).

Most of the structural paths described in the research model were significant, thus indicating that there is a theoretical justification for the proposed links among the constructs. In particular, two structural paths, P3 (from consumer innovativeness to advertising awareness) and P7 (from perceived infotainment to perceived credibility), were found to be particularly important, and they provide an important and practical implication: while a constant involvement in new information search directly and positively affect advertising awareness, the link between this awareness and attitude toward wireless ads depends largely on the mobile user group. The link turns out to be positive for Cluster 2 (middle-aged white-collar workers and professionals), but negative for Cluster 1 (housewives and part-timers) and Cluster 3 (students and "parasite singles").

As the industry is in the midst of a rapid transition from the 2.5G to the 3G network, this study provides useful insights for practitioners in other countries and contexts. First, the operators and the content providers should pay more attention to motivational aspects, in order to achieve stronger commitment by users. Current adopters mostly use simple entertainment, followed by email and news, but they may not be keen to adopt more enhanced technology, unless it provides them with strong and solid "reasons why" it can be used. Given the findings of this study, "short-sighted" positioning may lead to further defection by high-income professionals. Second, this study provides key lessons to be learned from Japan, in terms of this "trusted, branded, useful, easy-to-use, holistic package of services" in i-mode (Barnes & Huff, 2003). Despite obvious cultural and pricing differences, international mobile practitioners should take into account the taxonomy of mobile Internet adopters in Japan, given that this software platform and a content ecosystem is exportable to other countries, as is shown in the European, Asian and Oceania

markets. The fact that affluent youth is the core segment in mobile Internet adoption is especially important, given the existence of so-called “global youth culture”, members of which may share universal interests via enhanced telecommunication technologies. The youth culture of mobile usage may not be radically different in other parts of the world (Scuka, 2002).

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Appendix. Questionnaire items employed in this study

Constructs (number of items; measurement type)
Social information needs (7 items; assessed on a 5-point semantic differential scale) I am primarily concerned with health issues. I am primarily concerned with leisure activities. I am primarily concerned with my job. I am primarily concerned with politics. I am primarily concerned with education. I am primarily concerned with environmental issues. I am primarily concerned with aging issues.
Advertising awareness (4 items; assessed on a 5-point semantic differential scale) I frequently read newspaper ads. I frequently read magazine ads. I frequently watch television commercials. I frequently connect to the Internet advertising.
Consumer innovativeness (6 items; assessed on a 5-point semantic differential scale) I am very keen on fashion and fads. I am usually eager to buy a new product as soon it is as available. I usually try to look for new advertising messages. When I want to buy something new, I try to collect as much information as possible. I try to find new information by myself when it’s necessary. I really like collecting interesting information and recommending new things to my friends.
Perceived credibility (5 items; assessed on a 7-point semantic differential scale) The content of wireless ads can be believed. Promotional information on wireless ads can be trusted. The campaigns offered in wireless ads meet my expectations. The company sponsoring wireless ads has a good reputation. Companies named in wireless ads keep their promises.
Perceived informativeness (3 items; assessed on a 7-point semantic differential scale) I think wireless ads are informative. I usually learn a lot from wireless ads. Information I obtain from wireless ads is useful.

Appendix (continued)

Constructs (number of items; measurement type)

Perceived entertainment (3 items; assessed on a 7-point semantic differential scale) Wireless ads really entertain me.

I think the content of wireless ads is fun. I

feel excited when receiving wireless ads.

Attitude towards wireless ads (4 items; assessed on a 7-point semantic differential scale)

Wireless ads are good/bad.

Wireless ads are favourable/unfavourable. Wireless

ads are advantageous/not advantageous. Wireless

ads are wise/foolish.

Intention to access (2 items; assessed on a 7-point semantic differential scale)

If I receive an interesting promotion to my mobile, I will access the sites to check a further detail.

If I see an interesting campaign on my mobile, I will access the sites to apply for it.

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