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Keywords: QR code, mobile marketing, technology acceptance model, uses and gratifications theory, retail marketing

Mobile has changed retailers' perceptions

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Papers

Consumer acceptance of mobile marketing communications using the QR code

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Abstract

US retailers have begun to utilize the Quick Response (QR) code in their transmission of mobile marketing communications. This research explores US consumers' adoption intentions towards the QR code in the retail environment by incorporating two theories — the technology acceptance model and uses and gratifications theory — and two consumer traits, consumer innovativeness and 'market mavenism'. The data was collected from 340 students attending a southwestern US university. Results suggested that perceived usefulness, ease of use, market mavenism and enjoyment positively affected consumers' intent to adopt the QR code, while innovativeness had a negative effect. The findings suggest that retailers can create interactive and pleasant store environments and appeal to target groups of customers through mobile marketing communications using the QR code.

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Introduction

Mobile phones have rapidly become a primary communication, entertainment and shopping device for US consumers.^{1,2} The number of mobile phone users in the United States has reached 228 million,³ and 82 per cent of them use their mobile phones for product research and transaction purposes during the purchasing process.⁴ This new shopping behaviour has altered the way US retailers perceive the value of mobile marketing. Retailers prefer mobile marketing communications over conventional or computer-based marketing communications because of the added flexibility in creating and accessing marketing messages.⁵ In addition, mobile marketing allows marketers to create personalized and location-specific messages,⁶ and enables consumers to receive and respond to marketing messages at any time or location.⁵ Recognizing the ubiquity of mobile phones, which function as mini-computers, and the advancement of wireless internet technology, retailers have allocated considerable resources to implement effective mobile marketing strategies targeting consumers using mobile phones during their shopping trips.

QR codes fulfil consumer desire

The Quick Response (QR) code has emerged as the next retail innovation that fulfils the consumer desire for smart, convenient and experiential shopping via mobile phones.⁷ The QR code, a two-dimensional matrix barcode developed by the Japanese firm Denso Wave in 1994, can contain a wide array of product content, such as URLs, images and videos.⁸ The code can be printed on many product and advertising media (eg, product packaging, point-of-purchase displays and print ads), and consumers can access this content with any smartphone or mobile phone with a built-in camera and QR code reader software.⁵

The trend of using QR codes in mobile marketing communications has been perceptible for many years in Asia and Europe. However, the QR code has more recently been introduced to the US consumers. Although it still remains a relatively new idea in the United States, the number of businesses utilizing this innovative mode of mobile marketing communications has soared in the past few years.⁷ The QR code is especially beneficial to retailers as it serves as a fast and convenient gateway to consumer interaction. Retailers can affix the QR code to almost any object at minimal cost, integrate it into conventional media such as TV commercials or print ads, instantly connect with customers online and easily modify the contents embedded in the code as needed.^{4,7} Consequently, retailers could promote the QR code as a smart shopping tool that helps consumers obtain product information, receive promotional offers, make online purchases and experience enhanced shopping experiences.²

Doubling in US consumers using QR codes

Although QR code reader software is downloadable and free, about 40–60 million mobile phones in use in the United States feature a built-in QR code reader, which has expedited the acceptance of QR codes in the market.¹ The number of US consumers who are interested in using QR codes while shopping doubled in 2011 compared with the year before.⁹ These statistics present compelling reasons why US retailers should implement mobile communications using the QR code. Early adopters such as Macy's, Target and Best Buy have successfully integrated it into their marketing and store operations.^{7,10}

Despite these potential benefits to retailers and the increased number of consumers expressing their interest in scanning the QR code, little research has been conducted to document consumer behaviour towards the code in retail settings. As consumers must initiate an interaction with the QR code to access its marketing messages, it is critical that retailers understand what motivates consumers to scan the QR code during their shopping trips. The purpose of this research is to identify important determinants of the US consumers' intentions towards adopting the QR code and to present implications to retailers so that they can embrace this novel mobile communication technology for competitive advantage.

Theoretical background

Technology acceptance model

The technology acceptance model (TAM) has been a popular theoretical foundation for studies on consumer adoption of new technology. The TAM explains that consumers form favourable attitudes towards new technology and adopt it when they perceive the technology to be useful

and easy to use.¹¹ However, the TAM focuses on utilitarian motives (eg, perceived usefulness and perceived ease of use) of consumer technology adoption in work-related settings¹² and avoids explaining individual consumers' motivations towards technology adoption in everyday life.¹³

Many consumers consider shopping as an integral part of everyday life¹⁴ and mobile phones as devices they use daily.¹⁵ Previous studies evidenced that both non-utilitarian and utilitarian aspects of using mobile technologies are likely to influence consumer adoption decisions.^{12,16} Examples of QR code marketing communications in the retail environment offer both utilitarian and non-utilitarian benefits to consumers.^{4,7} With one scan of the QR code, consumers can easily access a retailer's website for product information or download discount coupons (utilitarian benefits). Retailers also link the QR code to entertainment-oriented content such as video clips and social media to allow consumers to interact with brands and other consumers (non-utilitarian benefits). Thus, it is critical to investigate consumer adoption of QR code marketing communications from both the utilitarian and non-utilitarian perspectives in the context of everyday usage.

Uses and gratifications theory

The uses and gratifications theory is commonly used in communications research to scrutinize individual consumers' utilitarian and non-utilitarian needs and motivations regarding the use of certain media.^{17,18} This theory is especially useful in explaining the consumer use of media and technology in daily life.¹² In the mobile communication era, the uses and gratifications theory remains relevant to explain consumer adoption of internet- and mobile-based media services.^{12,15,16,19,20} Extant studies on this theory have identified that utilitarian gratifiers pertain to perceived usefulness and perceived ease of use,^{12,19} whereas non-utilitarian gratifiers focus on the entertainment value of mobile media.^{12,16}

QR code applications demonstrate that retailers utilize the code to offer consumers more enjoyable shopping experience (non-utilitarian) as well as shopping information and convenience (utilitarian) via mobile phones.^{4,7} The present research combines uses and gratifications theory with the TAM to identify important utilitarian and non-utilitarian determinants affecting consumer adoption of the QR code while shopping.

Consumer innovativeness and market mavenism

Consumer innovativeness is frequently documented as one of the crucial variables explaining consumer behaviour in relation to technology-based shopping media and mobile services.^{16,21,22} The importance of market mavens in marketing communications has long been recognized and continues to grow, as mobile technology dictates how consumers communicate in today's marketplace.²³ Since the QR code is a new mobile-based communication service, this research integrates consumer innovativeness and market mavenism into a proposed research model to explain their influences on consumer adoption of the QR code.

Research model and hypotheses

Perceived ease of use and perceived usefulness

Perceived ease of use is defined as the degree to which effort is required to use a technology, and perceived usefulness is the degree to which using a technology enhances customers' perceived performance.¹¹ These

definitions apply to consumers' perceptions of the QR code and shopping performance in this research.

The positive effects of perceived ease of use on perceived usefulness and on consumer attitudes have been extensively documented in studies using the TAM in different contexts with varied study participants.^{24–29} More specifically in the context of mobile services (eg, mobile shopping, mobile learning, mobile text messaging, mobile payment, mobile gaming and mobile entertainment), consumers perceive mobile services to be more useful and regard them more favourably when these services are user-friendly.^{12,21,24,29,30} On the basis of these findings, it is a reasonable assumption that consumers are more likely to perceive the QR code to be useful and an effective mobile communication method when they regard using the code as trouble-free.

Positive effect on consumer perceptions

Thus, the following hypotheses are formulated:

Hypothesis 1: Perceived ease of use has a positive effect on consumers' perceived usefulness of the QR code.

Hypothesis 2: Perceived ease of use has a positive effect on consumer attitudes towards using the QR code.

A considerable body of TAM research has empirically confirmed the positive effect of perceived usefulness on consumer attitudes towards mobile services.^{12,21,24,28–30} These research studies have also shown that perceived usefulness positively influences consumer intentions to adopt a wide array of mobile services, including mobile shopping, mobile learning, mobile text messaging, mobile payments, mobile gaming and mobile entertainment. As the QR code is one type of mobile communications, this research proposes the following hypotheses:

Hypothesis 3: Perceived usefulness has a positive effect on consumer attitudes towards using the QR code.

Hypothesis 4: Perceived usefulness has a positive effect on consumer intentions to adopt the QR code.

Perceived enjoyment of QR codes

Consumers use various mobile services because they perceive these services to be fun and exciting.^{12,16} Taken from a previous study³¹ and modified for the interest of this research, perceived enjoyment refers to the extent to which consumers perceive using the QR code to be entertaining. Prior enjoyable experiences using technology may relieve consumers' apprehension and hesitancy. Perceived enjoyment of social network increased consumers' perceived ease of purchasing and seeking information from the website.²⁵ The positive effect of perceived enjoyment on perceived ease of use has also been validated for various mobile services.^{12,30}

The mobile market research by Nokia showed increasing importance of a 'fun' component of mobile services.³² The QR code enables consumers to engage in entertainment-oriented shopping activities such as connecting

**Perceived enjoyment
effects perceived ease
of use**

to a retailer's social networks³³ or mobile video content providing shopping tips.⁷ These examples illustrate that the QR code could enhance consumers' enjoyment of shopping experiences.

Thus, the following hypothesis is developed:

Hypothesis 5: Perceived enjoyment has a positive effect on perceived ease of using the QR code.

After reviewing 101 TAM studies, a group of researchers concluded that perceived enjoyment of using technology positively increases consumers' perceptions of technology usefulness.³⁴ For example, in cases where enjoyment is one of the main objectives of a specific mobile service, and consumers perceive this service as entertaining, they may also perceive the mobile service as useful. The previous study empirically confirmed perceived enjoyment as a significant antecedent of perceived usefulness in the context of mobile multimedia services.³⁵ This same relationship may exist in the context of the QR code in the retail environment, and it is likely that consumers may perceive the QR code to be useful, if using the code enhances their shopping enjoyment.

Thus, the following hypothesis is formulated:

Hypothesis 6: Perceived enjoyment has a positive effect on perceived usefulness of the QR code.

Perceived enjoyment of using a mobile service appears to have a positive effect on consumer attitudes towards the mobile service.¹² The same effect has been observed in the context of mobile learning, mobile broadcasting, mobile advertising, mobile text messaging, mobile payments and mobile gaming.^{12,16,30} These findings suggest that consumers may form positive attitudes towards the QR code when they perceive using the code to be enjoyable.

Thus, the following hypothesis is articulated:

Hypothesis 7: Perceived enjoyment has a positive effect on consumer attitudes towards the QR code.

**Attitude and
behavioural intention**

This research defines attitude as a consumer's overall feelings towards the QR code, and adoption intention as the strength of one's intent to use the code when shopping and recommend it to others. The direct and positive effect of attitude on behavioural intention towards using mobile services has been a main finding in studies on consumer adoption of mobile services.^{12,16,21,28,30,36} Since the QR code is a mobile-based service, this finding may be expanded to the relationship between consumer attitudes and their adoption intention towards the QR code.

Thus, the following hypothesis is formulated:

Hypothesis 8: Attitude towards using the QR code has a positive effect on consumer intention to adopt the QR code.

Consumer innovativeness and market mavenism

Researchers have recognized that consumer innovators and market mavens are two important consumer groups for retailers to target when introducing new products and services in the marketplace.³⁷ Consumer innovativeness is defined as an individual's willingness to investigate and adopt products, services or ideas.³⁸ Market mavenism refers to an individual's inclination to expand broad market knowledge and become involved in leading-edge shopping-related activities.³⁹ Although consumer innovativeness parallels market mavenism in some ways, they are considered two distinctive constructs that explain consumer interest in exploring various media channels for market information and exploring new developments in the marketplace.³⁷

Consumer innovativeness is a strong predictor of consumer intention to use interactive electronic media for shopping.⁴⁰ This relationship has been empirically confirmed in the context of mobile shopping and mobile multimedia broadcasting services.^{16,21}

Thus, the following hypothesis is articulated:

Hypothesis 9: Consumer innovativeness has a positive effect on consumer intention to adopt the QR code.

Market mavens exhibit an affinity for new technology that is significantly higher than that of non-mavens.^{23,41} For example, market mavens tend to adopt the internet quickly and spend many hours on the internet for entertainment and information.⁴² They also display strong interest in a marketing channel that allows interactive involvement.⁴¹ Since the QR code is a new mobile technology and effective communication channel for consumer interaction, it is likely to appeal to market mavens.

Thus, the following hypothesis is developed:

Hypothesis 10: Market mavenism has a positive effect on consumer intention to adopt the QR code.

Methodology of research

Establishing research measures

Variables were measured utilizing scales introduced in prior studies in the field. Four items measuring perceived ease of use and three items measuring perceived usefulness were adapted from previous TAM research.^{12,43} Perceived enjoyment was measured with three items adapted from the previous studies.^{12,13} Three items measuring attitude and five items measuring adoption intention were adapted from consumer behavioural intention studies.^{44,45} To measure consumer traits such as innovativeness and market mavenism, a three-item consumer innovativeness scale,²² and a six-item market mavenism scale³⁹ were adapted and used. The wording of each item was modified to suit the purpose of this research.

All measurement items except demographic-related questions were rated on a 5-point Likert-type scale anchored at 1 = strongly disagree and 5 = strongly agree. A group of 99 college students representing

Sample characteristics

demographic characteristics similar to the primary sample were pre-tested, and the survey was refined based on the pre-test results.

Researchers have long favoured studying college students' mobile technology acceptance because they are early adopters of new technology services^{16,28} and mobile phones.⁶ The sample used in this study was drawn from undergraduate students taking classes in business marketing or consumer behaviour at a large southwestern US university located in Texas.

In all, 358 students participated in the survey to earn extra credit; after excluding students submitting incomplete questionnaires, the sample comprised 340 participants. Of the respondents, 197 (57.9 per cent) were female and 143 (42.1 per cent) were male. The majority fell between the ages of 21 and 25 years (59.7 per cent), while 31.5 per cent were 20 years old and under. The remainder ranged from 26 to 43 (7.0 per cent) or did not provide their ages (1.8 per cent). Most respondents owned either smartphones or mobile phones with a built-in camera (93.5 per cent) and indicated that they were aware of the QR code (75.9 per cent). However, only 40.3 per cent of the respondents had scanned a QR code before the survey.

Analysis and results

This research used a two-step approach of structural equation modelling (SEM) to validate the measurement model and test the proposed research model and hypothesized relationships using LISREL 8.80. The overall model fit was assessed by chi-square (χ^2), comparative fit index (CFI), non-normed fit index (NNFI) and standardized RMR (SRMR).^{46,47} Cronbach's α was used to evaluate the internal reliability of scale items, and descriptive statistics of each construct were computed using SPSS 18.

Measurement model testing

The reliability and validity of the measurement model were tested using confirmatory factor analysis. One item from the market maven scale was excluded from the analysis owing to a low-squared multiple correlation.⁴⁸ The fit statistics confirmed an excellent model fit: $\chi^2 = 1369.58$ with 278 *df* at *p*-value < 0.001; CFI of 0.97; NNFI of 0.97; and SRMR of 0.05. Cronbach's α for each construct was in the range of 0.83–0.95, and factor loadings ranged from 0.70 to 0.96 with *p*-values < 0.01. The composite reliability (CR) ranged from 0.85 to 0.97, and the average variance extracted (AVE) ranged from 0.66 to 0.89. The measurement model results and descriptive statistics are presented in Tables 1 and 2, respectively.

Structural model and hypotheses testing

SEM was performed to evaluate the proposed research model and hypotheses. The overall fit indices indicated a good model fit: $\chi^2 = 1446.83$ with 286 *df* at *p*-value < 0.001; CFI of 0.97; NNFI of 0.97; and SRMR of 0.08. The standardized path coefficients and the results of statistical significance were shown in Figure 1 and Table 3.

Perceived ease of using the QR code positively affected consumer perception of its usefulness and attitude towards the code, supporting Hypotheses 1 ($\beta = 0.29$, *t*-value = 3.79, *p* < 0.001) and 2 ($\beta = 0.14$, *t*-value = 2.80, *p* < 0.01). The positive effects of perceived usefulness on consumer attitude and adoption intention towards the QR code were also

Table 1: Measurement model results

Constructs and items	Factor loadings ^a
<i>Perceived usefulness (Cronbach's $\alpha = 0.90$; CR^b = 0.92; AVE^c = 0.80)</i>	
QR codes would save me much time when shopping	0.88
Using QR codes enables me to accomplish shopping more effectively	0.89
Overall, I would find QR codes useful when shopping	0.91
<i>Perceived ease of use (Cronbach's $\alpha = 0.92$; CR = 0.94; AVE = 0.80)</i>	
My interaction with QR codes would be clear and understandable	0.82
It would be easy for me to become skilful at using QR codes	0.91
I would find QR codes easy to use	0.94
Learning to use QR codes would be easy for me	0.89
<i>Perceived enjoyment (Cronbach's $\alpha = 0.94$; CR = 0.96; AVE = 0.89)</i>	
Using QR codes can be fun	0.93
Using QR codes can be interesting	0.94
Using QR codes can be enjoyable	0.96
<i>Attitude (Cronbach's $\alpha = 0.91$; CR = 0.94; AVE = 0.84)</i>	
Using QR codes is a good idea	0.90
I am positive about using QR codes	0.94
The idea of QR codes is interesting to me	0.91
<i>Adoption intention (Cronbach's $\alpha = 0.95$; CR = 0.97; AVE = 0.86)</i>	
I intend to use QR codes in the future	0.91
I intend to use QR codes when shopping	0.96
I intend to seek products or services info via QR codes	0.90
I intend to purchase products or services via QR codes	0.94
I intend to recommend others use QR codes	0.92
<i>Consumer innovativeness (Cronbach's $\alpha = 0.83$; CR = 0.85; AVE = 0.66)</i>	
Usually I am among of the first to try out a new product	0.84
Often I try new products before my friends do	0.88
Generally, I enjoy buying new products	0.70
<i>Marketmavenism (Cronbach's $\alpha = 0.93$; CR = 0.95; AVE = 0.79)</i>	
I like introducing new brands and products to my friends	0.87
I like helping people by providing them with information about many kinds of products	0.89
People ask me for information about products, places to shop or sales	0.91
If someone asked where to get the best buy on several types of products	
I could tell him or her where to shop	0.89
My friends think of me as a good source of information when it comes to new products, but does not necessarily feel I am an expert on one particular product	0.87

^aCompletely standardized solution; all significant at 0.001.

^bComposite reliability.

^cAverage variance extracted.

Table 2: Correlation matrix^a and descriptive statistics

	(n = 340)						
	PU	EU	ET	AT	AI	CI	MM
Perceived usefulness (PU) (M = 3.62; Standard deviation = 0.93)	1						
Perceived ease of use (EU) (M = 3.88; Standard deviation = 0.84)	0.57	1					
Perceived enjoyment (ET) (M = 3.86; Standard deviation = 0.88)	0.57	0.70	1				
Attitude (AT) (M = 3.81; Standard deviation = 0.91)	0.72	0.69	0.73	1			
Adoption intention (AI) (M = 3.42; Standard deviation = 0.98)	0.75	0.58	0.63	0.78	1		
Consumer innovativeness (CI) (M = 3.37; Standard deviation = 0.86)	0.41	0.53	0.44	0.43	0.46	1	
Market mavenism (MM) (M = 3.62; Standard deviation = 0.88)	0.55	0.58	0.58	0.60	0.71	0.65	1

^aAll significant at 0.001.

Goodness-of-fit statistics:

Chi-square = 1446.83 ($df = 286$, $P = 0.00$); CFI = 0.97; NNFI = 0.97; SRMR = 0.08

Figure 1: Structural model of consumer adoption intention towards the QR code

Note: ** $p < 0.01$; *** $p < 0.001$.

Table 3: Results of the hypotheses testing

(n = 340)			
Hypotheses		Coefficient (t-value)	Results
Hypothesis 1	EU→PU	0.29*** (3.79)	Supported
Hypothesis 2	EU→AT	0.14** (2.80)	Supported
Hypothesis 3	PU→AT	0.48*** (10.50)	Supported
Hypothesis 4	PU→AI	0.33*** (6.01)	Supported
Hypothesis 5	ET→EU	0.78*** (14.06)	Supported
Hypothesis 6	ET→PU	0.43*** (5.58)	Supported
Hypothesis 7	ET→AT	0.39*** (6.98)	Supported
Hypothesis 8	AT→AI	0.38*** (6.60)	Supported
Hypothesis 9	CI→AI	-0.14** (-2.96)	Rejected
Hypothesis 10	MM→AI	0.44*** (8.67)	Supported

Note: ** $p < 0.01$; *** $p < 0.001$.

Hypothesis 9 is rejected because of a negative relationship.

established, supporting Hypotheses 3 ($\beta = 0.48$, $t\text{-value} = 10.50$, $p < 0.001$) and 4 ($\beta = 0.33$, $t\text{-value} = 6.01$, $p < 0.001$). Perceived enjoyment had positive impacts on both the perceived ease of use and usefulness of the QR code. It also enhanced consumers' favourable attitudes towards the code. Thus, Hypotheses 5 ($\gamma = 0.78$, $t\text{-value} = 14.06$, $p < 0.001$), 6 ($\gamma = 0.43$, $t\text{-value} = 5.58$, $p < 0.001$) and 7 ($\gamma = 0.39$, $t\text{-value} = 6.98$, $p < 0.001$) were supported. Like most consumer behaviour and intention studies, this research confirmed the positive effect of consumers' attitudes on their adoption intentions towards the QR code, supporting Hypothesis 8 ($\beta = 0.38$, $t\text{-value} = 6.60$, $p < 0.001$). With regard to the effects of consumer characteristics on their adoption intention, consumer innovativeness had a statistically significant effect on consumer adoption intention towards the QR code, but the effect was negative. Consequently, Hypothesis 9 ($\gamma = -0.14$, $t\text{-value} = -2.96$, $p < 0.01$) was not supported. Finally, market mavenism positively increased consumer QR code adoption intention, supporting Hypothesis 10 ($\gamma = 0.44$, $t\text{-value} = 8.67$, $p < 0.001$).

Summary of findings

Enjoyment motivates use of mobile services

Innovative shoppers less likely to use QR codes

Academic and managerial implications

Discussion and implications

The main focus of this research was to identify consumer adoption intention towards the QR code in retail settings using two theories: TAM, and uses and gratifications. The findings presented ample evidence that the TAM and uses and gratifications theory are applicable in explaining consumer acceptance of the QR code. When consumers perceived the QR code to be easy to use, they rated the code as useful (Hypothesis 1) and favourable (Hypothesis 2). Similarly, when consumers perceived the QR code to be highly useful, they formed a more favourable attitude (Hypothesis 3) and were more inclined to adopt the QR code (Hypothesis 4). These outcomes were consistent with the findings of previous studies that examined the same relationships in consumer adoption of mobile services.^{12,21,30}

This research corroborated the popular notion of enjoyment as one of the main motivations to use mobile services.^{12,30,35} Consumers recognized the QR code as easy to use (Hypothesis 5), useful (Hypothesis 6) and favourable (Hypothesis 7) when they thought using the code was fun and entertaining. Although all three antecedents (ease of use, usefulness and enjoyment) positively affected consumer attitudes towards the QR code, perceived usefulness influenced it to the greatest extent. This result was compatible with other studies that found perceived usefulness as a more effective predictor of consumers' positive attitudes towards mobile services than perceived ease of use and enjoyment.^{12,30,35} Similar to the findings of most mobile services adoption studies,^{12,16,28} consumers intended to adopt the QR code more strongly when they had a more positive attitude towards the code (Hypothesis 8).

Since the QR code is a new mobile-based communication technology that is frequently used in the retail environment, this research incorporated consumer characteristics pertaining to shopping behaviours, consumer innovativeness and market mavenism to understand consumer adoption intention towards the QR code. Contrary to the conclusions by several researchers,^{16,21} the more highly consumers rated their innovativeness in shopping, the less likely they were to adopt the QR code (Hypothesis 9) in this study. This contradiction may be because of different definitions of consumer innovativeness. Although domain-specific innovativeness was used in studies that found the positive relationship between innovativeness and consumer mobile technology acceptance,^{16,21} the present research assessed innovativeness by a consumer's propensity to purchase new products. In addition, considering the ubiquity of mobile phones, participants in this study may have perceived the QR code as one type of mobile phone applications rather than a new mobile technology for marketing communications.

Finally, consumers deemed to be market mavens exhibited a strong likelihood of adopting the QR code (Hypothesis 10). Retailers could benefit from using the QR code to communicate with market mavens as a means to promote their stores and merchandise.

Mobile phones have become important everyday devices for communication, entertainment and shopping.² Recognizing the considerable impacts of mobile devices on consumer behaviour, retailers

have implemented mobile marketing communications utilizing the QR code.

TAM is one of the most commonly used theories in consumer technology adoption studies, while uses and gratifications theory is considered one of the most dominant theories in communication studies.¹⁸ The present research adds value to the current body of literature by demonstrating that combining these two popular theories is effective in explaining consumer acceptance of mobile marketing communications using the QR code.

Retailers should offer useful QR codes

This research found that retailers should create QR codes that are easy to use and that embed useful and exciting contents. These findings echo the conclusion of the previous study.¹⁵ That is, a 'convenient form of entertainment' (p. 232) strongly motivates consumers to accept mobile marketing communications. The usefulness of the message is particularly important because it appears to be the most influential factor for consumer QR code adoption intention. To increase consumers' perceptions of QR code usefulness, retailers should customize the message to match the needs of different groups of consumers. Grocery and big-box retailers, for example, could use the code to offer shopping deals and discount coupons. Target is the prime example of this usage; Target has been offering QR code-based promotional coupons to its customers for years.⁷ Retailers of high-involvement products could use the QR code to provide the consumer with detailed product information. Best Buy has added QR codes to product fact tags and in-store signage, which allows consumers to obtain product information more easily and effectively.⁴ Retailers of hedonic goods might choose to raise consumers' enthusiasm by linking the QR code to entertainment and informational content. Macy's consumers can access video clips, the latest fashion trends and essential tips from style icons via QR codes developed for its marketing campaigns.⁷

Focus retail QR codes on market mavens

The findings also suggest that retailers should focus more on market mavens than innovators when communicating their marketing strategies using the QR code. Market mavens influence other consumers' shopping behaviours^{23,42} and could potentially help the acceptance of the QR code in the market. Thus, expansion of the effort to design marketing messages that suit the needs of market mavens should be considered.

QR codes may offer a new business paradigm

One major advantage of the QR code is that retailers can modify the contents embedded in the code without changing the code symbol itself.⁷ Retailers could capitalize on this advantage by substituting more compelling and relevant content appropriate for specific circumstances or target markets as needed. By becoming more aggressive, retailers could even use the QR code to create a new business paradigm. As a convenient gateway to websites, the QR code may be an effective, low-cost way to increase consumer traffic to online stores and mobile shopping.

Home Plus in South Korea, a discount store retail chain jointly owned by Samsung and Tesco, has created virtual stores at subway stations where consumers can shop with their mobile phones via QR codes. This strategy generated a 130 per cent increase in online sales and 76 per cent increase in the number of new registered online customers in a 3-month period.⁴⁹ Results such as those of Home Plus indicate that the QR code could be a

source of new revenue if it is implemented innovatively. Retailers can fortify their online business and appeal to mobile-savvy consumers by having websites, merchandizing and checkout/payment systems that work well with mobile phones and linking these systems using the QR code.

References

1. Kellogg, D. (2011) 40 percent of US mobile users own smartphones: 40 percent are Android. Nielsen Wire, http://blog.nielsen.com/nielsenwire/online_mobile/40-percent-of-u-s-mobile-users-own-smartphones-40-percent-are-android/, accessed 5 December.
2. Stone, D. (2012) 'Mobile — More than a magic moment for marketers', *Journal of Direct, Data and Digital Marketing Practice*, Vol. 13, No. 4, pp. 280–294.
3. CTIA. (2012) US wireless quick facts. CTIA — The Wireless Association, http://files.ctia.org/pdf/CTIA_Survey_YE_2012_Graphics-FINAL.pdf, accessed 14 March 2013.
4. Goldberg, J. (2010) Best Buy adds QR codes to product fact tags. Retail Customer Experience, <http://www.retailcustomerexperience.com/article/140212/Best-Buy-adds-QR-codes-to-product-fact-tags>, accessed 11 February 2011.
5. Cunha, C. R., Peres, E., Morais, R., Bessa, M. and Reis, M. C. (2010) 'Contextualized ubiquity: A new opportunity for rendering business information and services', *Journal of Theoretical and Applied Electronic Commerce Research*, Vol. 5, No. 3, pp. 55–64.
6. Rohm, A. J. and Sultan, F. (2006) 'An exploratory cross-market study of mobile marketing acceptance', *International Journal of Mobile Marketing*, Vol. 1, No. 1, pp. 4–12.
7. Batista, A. F. (2011) Macy's, target tap QR codes for extended customer interaction. Retail Touchpoints, <http://www.retailtouchpoints.com/cross-channel-strategies/778-macys-target-tap-qr-codes-for-extended-customer-interaction>, accessed 16 October.
8. Shiang-Yen, T., Foo, L. Y. and Idrus, R. (2011) 'Assessment of public perception toward mobile tagging system for retrieving information of genetically modified food', *International Journal of Applied Mathematics and Informatics*, Vol. 1, No. 5, pp. 17–25.
9. MGH. (2011) Breaking: QR code stats revealed. MGH Modern Marketing, <http://mgghus.com/blog/2011/03/23/breaking-qr-code-stats-revealed/>, accessed 17 October.
10. Zmuda, N. (2011) QR codes gaining prominence thanks to few big players. *Ad Age*, <http://adage.com/article/digital/qr-codes-gaining-prominence-macy-s-buy-post/149474/>, accessed 20 October.
11. Davis, F.D. (1989) 'Perceived usefulness, perceived ease of use, and user acceptance of information technology', *MIS Quarterly*, Vol. 13, No. 3, pp. 319–340.
12. Nysveen, H., Pedersen, P. E. and Thorbjørnsen, H. (2005) 'Intentions to use mobile services: Antecedents and cross-service comparisons', *Journal of the Academy of Marketing Science*, Vol. 33, No. 3, pp. 330–346.
13. Moon, J. and Kim, Y. (2001) 'Extending the TAM for a World-Wide-Web context', *Information and Management*, Vol. 38, No. 4, pp. 217–230.
14. Brusdal, R. and Lavik, R. (2008) 'Just shopping? A closer look at youth and shopping in Norway. Young', *Nordic Journal of Youth Research*, Vol. 16, No. 4, pp. 393–408.
15. Grant, I. and O'Donohoe, S. (2007) 'Why young consumers are not open to mobile marketing communication', *International Journal of Advertising*, Vol. 26, No. 2, pp. 223–246.
16. Kim, K. H., Ko, E., Takahashi, I., Schellhase, R., Kim, M. S. and Lee, C. H. (2008) 'A model of adoption of digital multimedia broadcasting (DMB) service: Comparisons in Korea, Japan, and Germany', *Psychology & Marketing*, Vol. 25, No. 8, pp. 806–820.
17. Eighmey, J. and McCord, L. (1998) 'Adding value in the information age: Uses and gratifications of sites on the world wide web', *Journal of Business Research*, Vol. 41, No. 3, pp. 187–194.
18. Lin, C. A. (1996) 'Looking back: The contribution of Blumler and Katz's uses and mass communication research', *Journal of Broadcasting & Electronic Media*, Vol. 40, No. 4, pp. 574–582.
19. Leung, L. and Wei, R. (2000) 'More than just talk on the move: Uses and gratifications of the cellular phone', *Journalism and Mass Communication Quarterly*, Vol. 77, No. 2, pp. 308–320.

20. Sultan, F., Rohm, A. J. and Gao, T. (2009) 'Factors influencing consumer acceptance of mobile marketing: A two-country study of youth markets', *Journal of Interactive Marketing*, Vol. 23, No. 4, pp. 308–320.
21. Aldás-Manzano, J., Ruis-Mafé, C. and Sanz-Blas, S. (2009) 'Exploring individual personality factors as drivers of M-shopping acceptance', *Industrial Management & Data Systems*, Vol. 109, No. 6, pp. 739–757.
22. Bauer, H., Barnes, S., Reichardt, T. and Neumann, M. (2005) 'Driving consumer acceptance of mobile marketing: A theoretical framework and empirical study', *Journal of Electronic Commerce & Research*, Vol. 6, No. 6, pp. 181–191.
23. Geissler, G. L. and Edison, S. W. (2005) 'Market mavens' attitudes towards general technology: Implications for marketing communications', *Journal of Marketing Communications*, Vol. 11, No. 2, pp. 73–94.
24. Bouwman, H., López-Nicolás, C., Molina-Castillo, F.-J. and Van Hattum, P. (2012) 'Consumer lifestyles: Alternative adoption patterns for advanced mobile services', *International Journal of Mobile Communications*, Vol. 10, No. 2, pp. 169–189.
25. Di Pietro, L. and Pantano, E. (2012) 'An empirical investigation of social network influence on consumer purchasing decision: The case of Facebook', *Journal of Direct, Data and Digital Marketing Practice*, Vol. 14, No. 1, pp. 18–29.
26. Ha, S. and Stoel, L. (2009) 'Consumer e-shopping acceptance: Antecedents in a technology acceptance model', *Journal of Business Resources*, Vol. 62, No. 5, pp. 565–571.
27. Huang, E. (2008) 'Use and gratification in e-consumers', *Internet Research*, Vol. 18, No. 4, pp. 405–426.
28. Kulviwat, S., Bruner II, G. C., Kumar, A., Nasco, S. A. and Clark, T. (2007) 'Toward a unified theory of consumer acceptance technology', *Psychology & Marketing*, Vol. 24, No. 12, pp. 1059–1084.
29. Leong, L.-Y., Ooi, K.-B., Chong, A. Y.-L. and Lin, B. (2011) 'Influence of individual characteristics, perceived usefulness and ease of use on mobile entertainment adoption', *International Journal of Mobile Communications*, Vol. 9, No. 4, pp. 359–382.
30. Huang, J.-H., Lin, Y.-R. and Chuang, S.-T. (2007) 'Elucidating user behaviour of mobile learning: A perspective of the extended technology acceptance model', *The Electronic Library*, Vol. 25, No. 5, pp. 585–598.
31. Davis, F. D., Bagozzi, R. P. and Warshaw, P. R. (1989) 'User acceptance of computer technology: A comparison of two theoretical models', *Management Science*, Vol. 35, No. 8, pp. 982–1003.
32. Cellular News. (2004) Mobile content shows revenue promise. *Cellular News*, <http://www.cellular-news.com/story/11077.php>, accessed 20 November 2011.
33. Dou, X. and Li, H. (2008) 'Creative use of QR codes in consumer communication', *International Journal of Mobile Marketing*, Vol. 3, No. 2, pp. 61–67.
34. Lee, Y., Kozar, K. A. and Larsen, K. R. T. (2003) 'The technology acceptance model: Past, present, and future', *Communications of the Association for Information Systems*, Vol. 12, No. 1, pp. 752–780.
35. Sung, J. and Yun, Y. (2010) 'Toward a more robust usability concept with perceived enjoyment in the context of mobile multimedia service', *International Journal of Human Computer Interaction*, Vol. 1, No. 2, pp. 12–32.
36. Chong, J.-L., Chong, A. Y.-L., Ooi, K.-B. and Lin, B. (2011) 'An empirical analysis of the adoption of m-learning in Malaysia', *International Journal of Mobile Communications*, Vol. 9, No. 1, pp. 1–18.
37. Goldsmith, R. E., Flynn, L. R. and Goldsmith, E. B. (2003) 'Innovative consumers and market mavens', *Journal of Marketing Theory Practices*, Vol. 11, No. 4, pp. 54–64.
38. Goldsmith, R. E. (2001) 'Using the domain specific innovativeness scale to identify innovative Internet consumers', *Internet Research: Electronic Networking Applications and Policy*, Vol. 11, No. 2, pp. 149–158.
39. Feick, L. F. and Price, L. L. (1987) 'The market maven: A diffuser of marketplace information', *Journal of Marketing*, Vol. 51, No. 1, pp. 83–97.
40. Eastlick, M. and Lotz, S. (1999) 'Profiling potential adopters of and non-adopters of an interactive electronic shopping medium', *International Journal of Retail & Distribution Management*, Vol. 27, No. 6, pp. 209–223.

41. Barnes, S. J. and Pressey, A. D. (2012) 'In search of the "Meta-Maven": An examination of market maven behaviour across real-life, web, and virtual world marketing channels', *Psychology & Marketing*, Vol. 29, No. 3, pp. 167–185.
42. Belch, M. A., Krentler, K. A. and Willis-Flurry, L. A. (2005) 'Teen internet mavens: Influence in family decision making', *Journal of Business Research*, Vol. 58, No. 5, pp. 569–575.
43. Pavlou, P. A. (2003) 'Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model', *International Journal of Electric Commerce*, Vol. 7, No. 3, pp. 101–134.
44. Ko, E., Kim, E. Y. and Lee, E. K. (2009) 'Modeling consumer adoption of mobile shopping for fashion products in Korea', *Psychology & Marketing*, Vol. 26, No. 7, pp. 669–687.
45. Yang, K. (2010) 'Determinants of US consumer mobile shopping services adoption: Implications for designing mobile shopping services', *Journal of Consumer Marketing*, Vol. 27, No. 3, pp. 262–270.
46. Hu, L. and Bentler, P. M. (1999) 'Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives', *Structural Equation Modeling*, Vol. 6, No. 1, pp. 1–55.
47. Kline, R. B. (2005) *Principles and Practice of Structural Equation Modeling*. Guilford Press, New York.
48. Hooper, D., Coughlan, J. and Mullen, M. R. (2008) 'Structural equation modeling: Guidelines for determining model fit', *Electronic Journal of Business Research*, Vol. 6, No. 1, pp. 53–60.
49. Solon, O. (2011) Tesco brings the supermarket to time-poor commuters in South Korea. Wired, <http://www.wired.co.uk/news/archive/2011-06/30/tesco-home-plus-billboard-store>, accessed 3 December.