

Research Paper

QR Code adoption and mobile marketing practices in Portugal: An empirical study.

Adoção do QR Code e Práticas de Mobile Marketing em Portugal: um estudo empírico.

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ABSTRACT

The Quick Response (QR) code is seen as an emerging mobile technology that could have a high impact on the mobile marketing practices, including shopping, advertising, sales promotion, direct marketing and customer relationship management.

This study investigates the intention to adopt the QR Code and its influence on digital marketing. To achieve this purpose an email survey was carried out among a sample of 116 graduate Portuguese students. The results indicate that consumers broadly know the new technology that was mainly used by them to access websites and other information online and less for shopping. Another conclusion is that the Portuguese consumer has been developed a positive attitude regarding the use of the QR Code as most of the respondents are interested in trying this new tool in the future. Besides, many respondents reveal an intention to apply the code in different circumstances as it is perceived as simple to use and useful, although for financial constraints many respondents do not have a mobile device or an application (app) to read the code.

Keywords: QR Code; Digital Marketing; Mobile Marketing; Uses and Motivations.

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RESUMO

O código de resposta rápida (QR Code) é encarado como uma tecnologia móvel emergente que pode ter um grande impacto nas práticas de mobile marketing, incluindo compras, publicidade, promoções, marketing direto e CRM (Customer Relationship Management).

Este estudo investiga as intenções de adoção do QR Code e a sua influência no marketing digital. Para alcançar este objetivo foi lançado um inquérito por email a uma amostra de 116 estudantes Portugueses licenciados. Os resultados indicam que os consumidores conhecem genericamente a tecnologia que é usada mais para aceder a websites e para recolher informação online do que para comprar. Outra conclusão do estudo aponta para que o consumidor Português desenvolveu uma atitude positiva em relação ao uso do QR Code, na medida em que os inquiridos estão interessados em experimentar esta nova ferramenta no futuro. Para além disso, muitos inquiridos revelaram a intenção de aplicarem o código em diferentes situações, uma vez que é percebida como fácil de usar e útil, embora por restrições financeiras muitos inquiridos não possuam ainda um telemóvel ou uma aplicação (app) capazes de ler o código.

Palavras chave: QR Code; Marketing Digital; Mobile Marketing; Usos e Motivações.

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1. INTRODUCTION

The availability and uptake of more affordable devices (smartphones), the types of plan on offer in the market and the continuous double-digit growth rates of the mobile segment provided marketers with the opportunity to use mobile phones in combination with QR code for marketing purposes (Michael & Salter, 2006, ITU, 2014). Also, availability of online content has been increasing, much of which is user-created through social media applications and platforms (e.g. Twitter, YouTube, WhatsApp). These applications are available through mobile platforms (mobile apps) and mobile internet that are used by citizens and public and private organizations (ITU, 2014).

The integration of QR codes in the mobile marketing strategy has been increasing worldwide as a way to promote communication and interaction between the brands and the consumers. In Portugal there are more than 4 million smartphones users, concentrated in major urban cities (Lisbon and Porto), most of them (60%) are young

(between 15-24 years of age), and belonging to a wealthy social class (Marktest, 2014). The use of QR code implies the creation and printing of a code that can be quickly read by a smartphone or tablet to provide additional useful information related to a product, service, brand or other objects (Liao & Lee, 2010; Ryu & Murdock, 2013). The mobile devices incorporated features such as ubiquity, personalization, two-way communication and localization that could change the marketing practices and offer an array of opportunities for marketers (Smutkupt, Krairit & Esichaikul, 2010). However, with few exceptions, little systematic research has been undertaken to measure the acceptance of QR codes by consumers in general (Ryu, 2013; Meydanoglu, 2013).

The objective of this exploratory study is to examine whether Portuguese consumers are ready for QR code adoption in the mobile marketing context and the reasons that motivate or inhibit the use of this new technology. These objectives will enhance our understanding of the individual's beliefs or motives to use the QR Code and to show how these factors affect individual's acceptance of that technology aiding mobile marketing practitioners in their quest to achieve success.

This paper begins with a review of the main applications of the QR code on mobile marketing activities, where the emphasis is placed on mobile advertising, mobile sales promotion, mobile direct marketing and mobile customer relationship management. Then, the research methodology employed is specified, which is followed by the presentation and discussion of empirical findings. Finally, the article highlights implications for mobile marketing practitioners and outlines the limitations of the study along with future research directions.

2. LITERATURE REVIEW

2.1 QR Code and Mobile Marketing

The popularity of mobile devices (Android and iOS) has radically changed the mobile marketing environment. For that reason mobile marketers around the world are spending increasing amounts of money on marketing activities in mobile media. The Mobile Marketing Association (2006, p. 22) defined mobile marketing as “the use of wireless media as an integrated content delivery and direct-response vehicle within a cross-media marketing communications program”.

The QR code is a free technology introduced by the Japanese company Denso-Wave in

1994 (Liao & Lee, 2010). In the present, there are five types of QR Codes: The Models 1 and 2 (Denso Wave, 2013a)), the micro QR (Denso Wave (2013b)), the iQR (Denso Wave (2013c)), the SQRC (Denso Wave (2013d)) and the LogoQ (Denso Wave (2013e)). These codes were developed along the years to respond to the different needs of consumers and firms (Sousa, 2014). A QR code represents a two-dimensional matrix-type version of the well known barcode that connects both the physical and digital world by the means of mobile tagging (Meydanoglu, 2013; Ryu & Murdock, 2013; Sousa, 2014). In mobile marketing the use of QR code implies the creation and printing of the code, the reading of the code by a mobile device and the access to a website or mobile application. Therefore, QR code technology is of utmost importance for firm's mobile marketing and marketing communication strategies that will consider all forms of communication, all message delivery channels, customers and prospects, and all brand contact points (Liao & Lee, 2010; Cata, Patel & Sakagushi, 2013; Ryu & Murdock, 2013).

One of the challenges that face the marketer is how to use the QR code to take competitive advantage of mobile marketing strategies (Smutkupt, Krairit & Esichaikul, 2010). The development of an effective mobile marketing strategy must consider not only the specific set of activities that a firm undertakes to perform a mobile marketing campaign but also how the firm employs a combination of communication tools and integrates its many communications channels to deliver a clear, consistent and compelling message about the company and its products (Kitchen, Brignell, Li & Spickett-Jones, 2004).

There are two major types of mobile marketing strategies. The push-based refers to any content sent by or on behalf of advertisers and marketers to a mobile device at a time other than when the subscriber requests it. This includes, for instance, audio, short message service (SMS) messages, e-mail, multimedia messaging, cell broadcast, picture messages, surveys, or any other pushed advertising or content (Mobile Marketing Association, 2006). The pull-based mobile marketing strategy is defined as any content sent to the mobile subscriber upon request shortly thereafter on a one time basis. For instance, when a customer requests a mobile coupon or whenever the content of the response, including any related marketing communication, is pull-based mobile marketing (Mobile Marketing Association, 2006). It is important that that the push and pull elements of the mobile marketing strategy work hand-in-hand with the push and

pull elements of the rest of the firm marketing strategy.

Shankar, Venkatesh, Hofacker & Naik (2010) found several mobile marketing practices or initiatives. These practices include mobile website creation and maintenance, mobile emailing and messaging, mobile advertising, mobile couponing, mobile customer service and mobile social network management (Shankar, Venkatesh, Hofacker & Naik, 2010; Okazaki, Hirose, & Li, 2011; Okazaki, Navarro-Bailón, & Molina-Castillo, 2012; Cata, Patel & Sakagushi, 2013; Meydanoglu, 2013). Other studies focused, for example, on the use of QR codes in retailing (Ryu, 2013; Ryu & Murdock, 2013), consumer communication (Dou & Li, 2008) and print advertising (Rajendra & Hemant, 2013; Bohm & Ruthardt, 2014). Alexander (2012) indicates that even professional service firms such as accounting could use the QR Code for marketing purposes. According to Leppäniemi (2008) the QR codes could be incorporated in mobile marketing activities such as mobile advertising, mobile sales promotion, mobile direct marketing and mobile customer relationship management.

2.1.1 Mobile advertising

QR code is a physical browsing that can be used to distribute information to mobile phone or to provide mobile phone users the access to internet by pointing their device at a code. Marketers can use QR codes to provide access to websites in which through various tools (e.g. questionnaires, voting) information about the needs and wants of customers are collected. QR code could also be used for various marketing activities (Leppäniemi & Karjaluoto, 2005; Leppäniemi, 2008; Smutkupt, Krairit & Esichaikul, 2010; Meydanoglu, 2013). One of these activities could be mobile advertising, including mobile internet (e.g. banner ads and interstitials), mobile search, and mobile portal. More activities comprise mobile broadcast radio and streamed and/or broadcast mobile TV services; mobile casting (a podcast designed to be downloaded by a mobile phone) and bluecasting (Bluetooth technology). Finally, a category of advertising formats, such as visual radio (i.e. images and text synchronized with the radio broadcast), in-game advertising (i.e. product placement in mobile games), Idle phone (i.e. advertising on a mobile phone's idle screen), and ringback tones (i.e. using a ringback tone for advertising or promotional purposes) (Leppäniemi & Karjaluoto, 2005; Leppäniemi, 2008; Smutkupt, Krairit & Esichaikul, 2010).

2.2 Mobile sales promotion

Mobile sales promotion contains both entertainment and infotainment. The majority of

mobile sales promotions contain both entertainment and infotainment elements, such as branded ringtones, logos, wallpapers, and mobile advergames (i.e. the use of mobile games to advertise or promote a product or brand). Other marketing activities are sponsored mobile content such as news, sport scores, comics, jokes, horoscopes, and weather forecasts that could be received on mobile phone. In addition, competitions in a variety of forms are a popular sales promotion tool in mobile marketing including all kind of quizzes, voting, and text 'n' win promotions. Mobile promotions are usually advertised in other media such as the insertion of the QR code in on-pack, billboard or press. The customer is invited to access a QR code for a chance to win a prize. Finally, there are a considerable number of mobile marketing activities, such as requesting more information or ordering sample by reading a QR code, and receiving mobile coupons or money-off offers to the mobile phone (Smutkupt, Krairit & Esichaikul, 2010; Okazaki, Hirose, & Li, 2011; Okazaki, Navarro-Bailón, & Molina-Castillo, 2012; Okazaki, Navarro & Campo, 2013; Cata, Patel & Sakagushi, 2013).

2.3 Mobile direct marketing

Mobile direct marketing refers to the permission-based messages (e.g. SMS, MMS and Email messages) that are personalized or targeted to the customer based on individual customer information or knowledge (Leppäniemi, Sinisalo & Karjaluoto, 2006; Leppäniemi, 2008; Smutkupt, Krairit & Esichaikul, 2010; Beneke, 2011).

2.4 Mobile customer relationship management (mCRM)

The mobile customer relationship management can be divided into five subcategories (Leppäniemi, Sinisalo & Karjaluoto, 2006; Sinisalo, Salo, Karjaluoto & Leppäniemi, 2007; Leppäniemi, 2008). The first subcategory is the customer service that includes a wide variety of solutions that could be read and downloaded by customer's mobile phone. For instance, alerts (e.g. appointment remainder or stock exchange information), check-in services (e.g. frequent fliers could check in for flights in advance using text messages), mobile ticket (e.g. train tickets), and content catalogs for regular customers (e.g. order branded content such as games, ringtones and wallpapers to their mobile device).

Second, there is a mobile commerce category that includes mobile banking and brokerage (e.g. customers use their mobile devices to access their accounts and pay their bills, and brokerage services, in which stock quotes can be displayed and trading conducted from the same mobile device), mobile payment (i.e. paying for goods or

services with a mobile device), bidding (e.g. SMS re-bidding service that enables users to track bids via 'outbid' alerts, and react quickly from their mobile should they need to increase a bid), and mobile betting and gambling (i.e. betting and gambling done on a mobile device). Third, a market research could be made by a mobile survey solution (e.g. SMS, mobile Internet or JAVA) (Esomar, 2012). Fourth, there is a category we named as a mobile community that includes a wide range of solutions that are close to many mobile services solutions (e.g., a band can have mobile collectible that serves a dual role by acting as a promotional tool for the band, allowing fans a way to keep up-to-date on the band's activities, and by serving as a catalog for the band's mobile content). Finally, there is a vast array of mobile services designed for business-to-business markets (e.g. mobile data communications between machines and mobile workforce solutions, such as a remote access to intranet services using mobile access technology).

3. METHODOLOGY

The previous section had shown that QR codes can be a technology that enables marketers to implement successful mobile marketing strategies. In order to know how to manage QR code for marketing purposes it is critical to understand the uses and motivations to adopt that new technology. To attain this goal, a web-based questionnaire (Lime Survey Platform) was developed to incorporate different questions about the uses and motivations of QR codes by Portuguese consumers. The questionnaire integrates three groups. The first group includes two questions (age, gender), the second group displays questions about the knowledge of QR Code, location where it can be found, barriers to use and QR Codes content. The questions about the influence of digital marketing campaigns based on QR code on consumer buyer behaviour and frequency of QR code use was measured from 1= very rarely to 5= always. These questions were based on the study developed by NetSonda (2014).

The third group is composed by eighteen questions adapted from the study of Ruy and Murdock (2013). Four items measured perceived ease of use and three items measured perceived usefulness, perceived enjoyment and attitude was measured with three items each and five items measuring adoption intention. These constructs and items incorporate the technology acceptance model (TAM) that has been used by Davies (1989) to study consumer adoption of new technologies. The TAM explains that

consumers form favorable attitudes towards new technology and adopt it when they perceive the technology to be useful and easy to use (Davies, 1989). Later developments on this framework add the perceived enjoyment and the intention to use (Chuttur, 2009). The TAM seems to be more appropriate to explain the use of new technologies, such as QR Code, in online contexts (Chen, Li & Li, 2011).

The measurement items were rated on a 5-point Likert-type scale anchored at 1=strongly disagree and 5=strongly agree, including the question of the second group – “interest for digital marketing of the QR Codes”. The questionnaire was pre-tested among a group of undergraduate students with demographic characteristics similar to the final sample and, after that, some questions was changed. We study graduate students’ because they are frequently early adopters of new technology services and mobile devices (Ruy and Murdock, 2013). The sample used in this study was drawn from graduate students and *alumni* of a large Portuguese Polytechnic school.

The data collection was undertaken between 1st of July and 16th September, 2014 and the total number of answers was 285. The data was later exported to SPSS, version 21, for statistical analysis. The sample’s characteristics indicate an overrepresentation of female respondents (62.4%) and younger people (18-27 years, 61.4%). This age bias is premeditated as the millennial generation or generation Y (people around 17 and 27 years of age) are the first to come of age with mobile devices, that allow a permanent connection to their social circles via online and mobile, and the interaction (personal and directly) with companies via social media (BCG, 2012; Nielsen, 2014). This is the reason why the data is displayed by age cohorts. The use of cohorts tries to represent the millennial generation and the generation X, respectively including demographic groups between the ages of 18 - 27 and 28 – 37.

4. RESULTS

The analysis of the knowledge that people have about the technology (Table 1) shows that a large majority of the respondents have already seen a QR code (79.6%), while only 4.9% do not seen one yet, and 15.4% didn’t answer to this question. Asked about the usefulness of a QR code, 41.1% choose as first option the “code of digital nature read by mobile devices” which indicates a correct understanding on how to use a QR code. In the same line, follows the “access to website and other information online”

answered by 27.7% of the respondents and “access to images and videos” by 21.4%. These results demonstrate that the knowledge of the Portuguese consumer about the QR code is very high in particular among the younger generation, although there is a number of consumers demonstrating a significant lack of understanding of QR codes as some of them pointed out the its use for “storage of private data with security” and “repair damage data”. The differences in the knowledge about the use of QR code between the two age groups are favourable to the younger group, with the exception of the category “access to website and other information online” where the older group seems to be more aware of this type of service provided by the code.

Table 1 – Knowledge of QR Code

Uses	18 – 27 years (*)					28 – 37 years (*)				
	1st	2nd	3th	4th	5th	1st	2nd	3th	4th	5th
1	24 (8,4)	13 (4.6)	13 (4.6)	34 (11.9)	37 (13.0)	8 (2.8)	6 (2.1)	5 (1.8)	7 (2.5)	17 (6.0)
2	2 (1.1)	5 (1.8)	7 (2.5)	14 (4.9)	36 (12.6)	0 (-)	0 (-)	5 (1.8)	7 (2.5)	17 (6.0)
3	14 (4.9)	23 (8,1)	25 (8.8)	32 (11.2)	17 (6.0)	3 (1.1)	11 (3.9)	9 (3.2)	20 (7.0)	3 (1.1)
4	87 (30.5)	31 (10.9)	18 (6.3)	7 (2.5)	10 (3.5)	30 (10.5)	14 (4.9)	11 (3.9)	3 (1.1)	2 (0.7)
5	15 (5.3)	58 (20.4)	40 (14)	19 (6.7)	8 (2.8)	45 (15.8)	21 (7.4)	9 (3.2)	6 (2.1)	6 (2.1)
6	4 (1.4)	12 (4.2)	13 (4.6)	12 (4.2)	20 (7.0)	2 (0.7)	0 (-)	4 (1.4)	2 (0.7)	12 (4.2)
7	1 (0.4)	0 (-)	3 (1.1)	8 (2.8)	15 (5.3)	1 (0.4)	1 (0.4)	0 (-)	5 (1.8)	0 (-)
8	10 (3.5)	20 (7.0)	43 (15.1)	36 (12.6)	19 (6.7)	5 (1.8)	8 (2.8)	18 (6.3)	11 (3.9)	4 (1.4)

Notes: Author’s own survey; N = 285; Percentage values in parenthesis; (*) Multiple response question; Uses: 1 – Storage of all type of data; 2 – Two dimensions storage; 3 – 360° reading and faster than barcode; 4 - Code of digital nature read by mobile devices; 5 - Access to website and other information online; 6 – Storage of private data with security; 7 – Repair damage data; 8 – Access to images and videos.

To view the content of a QR code involves downloading the application, scanning the code with the aid of the phone’s view screen and visiting the returned website or sending the decoded SMS text message. Then, the ideal location of a QR code is one where the user has both enough time to pull out their phone to scan the code and no other means to quickly engage with the messaging. Regarding the location of the QR

code (Table 2) most of the respondents have seen it on offline print ads, such as magazines (178) and newspapers (125), flyers (153), posters (151), point-of-purchase signage (112) and direct mail (106). A small amount of respondents indicate restaurant tables or posters, museum guides and product package as locations for QR codes. It is important to note that although QR code adoption and usage is increasing across virtually all demographics, the heaviest users still are younger consumers.

Table 2 - Locations of QR Code

Locations of QR Codes	Total (*)	18 – 27 years (*)	28 – 37 years (*)
Flyers	153	110	43
Posters	151	112	39
Direct mail	106	74	32
Product package	70	56	14
Restaurant tables	69	50	19
Newspapers	125	89	36
Magazines	178	128	50
Point-of-purchase signage	112	79	33
Museum guides	44	27	17

Notes: Author's own survey; (*) Multiple response question.

After being exposed to the QR code, 82 of respondents said that can obtain “more information about a product or service”, access a promotional campaign (65) or access a website or a social network (62). The table 3 also shows that of those interested in the content of a QR code, only some of them has searched for contact information (36), multimedia or more information (44 each). There were significant differences between the two groups as the younger generation denotes more interest in downloading the mobile applications than the older one.

Table 3 – Content of QR Code

Contents	Total (*)	18 – 27 years (*)	28 – 37 years (*)
Access website or social network	62	44	18
More information about product or service	82	54	28
More information about brand or organization	44	27	17
Promotional content (coupon, deal, etc.)	65	48	17
Images, texts, videos, music	44	35	9
Contact information	36	23	13

Notes: Author's own survey; (*) Multiple response question.

As can be seen on table 4, the respondents that did not use the QR code reported as main barrier the lack of a mobile application (45). One of the reasons could be due to the fact that reader software is not usually pre-installed on smartphones or that the benefits of scanning QR codes are often not immediately recognizable for users. In addition, unsatisfactory usage experiences may also hamper the use of QR codes that is often aimed at offering an innovative design element rather than using this technology in a way which adds value for the users. One common example is when QR codes are connected to websites which have not been optimized for mobile devices or which only offer redundant information already contained in the corresponding print medium (Bohm & Ruthardt, 2014). The lack of a mobile device (40), the inaccessibility to internet (18) and the inability to use the mobile device to read the QR code (31) are another reasons pointed out by respondents. A small number of respondents indicate minimal interest in using the QR code. However, in the younger group the barriers seem to be more related with financial reasons than with the interest in using the code.

Table 4 – Barriers to use

Barriers to use	Total (*)	18 – 27 years (*)	28 – 37 years (*)
Don't have mobile device	40	32	8
Don't have a mobile application or "app"	45	36	9
Don't have internet on mobile device	18	17	1
I don't know how to use it	31	27	4
I don't think its functional	6	2	4
I don't see any advantage	17	11	6
I can't download the application	1	1	0

Notes: Author's own survey; (*) Multiple response question.

Asked about the influence of digital marketing campaigns based on QR code (Table 5), the results showed that respondents' main use of QR codes was to obtain information about new products, brands, sales promotion or other marketing activities ($M = 2.53$). Likewise, the influence of QR codes on the buyers' decision making is not seen as an important mobile marketing tool ($M = 1.98$) as well as for changing consumers' attitudes regarding the interaction with the brand or organization ($M = 1.92$). The ANOVA tests for the differences of age between the two groups showed no statistical significance.

Table 5 – The influence of digital marketing campaigns based on QR code

Uses	Total (N = 116)		18 – 27 years (N = 81)		28 – 37 years (N = 35)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Influence the buyers decision making of a product or service	1.98	0.844	2.01	0.798	1.91	0.951
Influence by giving information about new products, brands, sales promotion and other marketing activities	2.53	0.927	2.56	0.88	2.49	1.04
Change consumers' attitudes regarding the experience with the brand, product, service or organization	1.92	0.970	1.91	0.951	1.94	1.02

Note: S. D. Standard Deviation

Regarding the frequency of use of QR code (Table 6) the respondents that effectively used or currently use the QR code (40.7%) are less than the non-users (59.3%). Even so, many of them are light users as rarely use (23.9%) or sometimes use (11.2%) the QR code. The heavy users of QR code are just 3.5% which is a minority indicating that the process of technology adoption is still in its infancy. The values of the means are very similar ($M=2.40$; $M=2.41$; $M=2.37$) and the ANOVA test reported no differences of frequency of use between the two groups.

Table 6 – Frequency of QR Code use

Frequency of use	Total (N = 116)		18 – 27 years (N = 81)		28 – 37 years (N = 35)	
	N	%	N	%	N	%
Very rarely	6	2.1	5	4.3	1	1.0
Rarely	68	23.9	45	38.8	23	19.8
Sometimes	32	11.2	24	20.7	8	6.9
Many times	10	3.5	7	6.0	3	2.5
Always	0	0.0	0	0.0	0	0.0
No answer	169	59.3	-	-	-	-
Total	285	100.0	81	69.8	35	30.2
Mean	2.40		2.41		2.37	
Standard Deviation	0.721		0.738		0.690	

Descriptive statistics (mean and standard deviations), reliability analysis and correlations between the dependant variable (frequency of use) and the items of the Technology Acceptance Model (TAM) were calculated to ascertain whether relationships with the independent variables might exist (Malhotra, 1999; Zikmund, 2000).

As noted above the frequency of use of QR code by Portuguese consumers could be considered below the average ($M=2.40$ in a 1 to 5 points scale). However, a closer look at some independent variables show that the perceived ease of use has registered high mean values demonstrating that QR code could be easy to learnt ($M=4.22$), used ($M=4.03$) and enjoyed ($M=4.09$) revealing that QR code has the potential to satisfy effectively the needs of the consumers in the future.

The results obtained from the reliability analysis show that all the five constructs are robust with Cronbach's alphas between 0.849 and 0.899, indicating internal consistency

of all the included items. Table 7 depicts a moderate, but positive and statistical significant relationships between the frequency of use and the constructs perceived usefulness, enjoyment and ease of use of the QR code, the attitude toward QR code and the intention to use the technology in the mobile marketing context.

The more important correlations with the dependant variables are registered with the intention to use the QR codes in the future ($r=0.458$). Overall, the respondents' found QR codes easy to use ($r=0.377$) and interact ($r=0.395$), a good idea ($r=0.375$) and a technology to recommend to friends and relatives ($r=0.0.375$).

Table 7 - Correlations between frequency of use of QR code and perceived usefulness, enjoyment, ease of use, attitude toward QR code and adoption intention

Variables and items	Correlations	Mean	Standard Deviation
Frequency of use of QR code	1	2.40	0.721
Perceived Usefulness	RA: Cronbach's $\alpha=0.868$		
X11 – Using QR codes enables me to accomplish shopping more effectively	0.299**	2.97	0.950
X16 – Overall, I would find QR codes useful when shopping	0.352**	2.98	0.987
X20 – QR codes would save me much time when shopping	0.271**	2.69	0.946
Perceived enjoyment	RA: Cronbach's $\alpha=0.849$		
X1 – Using QR codes can be interesting	0.295**	4.09	0.722
X12 – Using QR codes can be fun	0.229*	3.70	0.836
X13 – Using QR codes can be enjoyable	0.273*	3.72	0.800
Perceived ease of use	RA: Cronbach's $\alpha=0.866$		
X2 – My interaction with QR codes would be clear and understandable	0.395**	3.90	0.817
X6 – Learning to use QR codes would be easy for me	0.289**	4.22	0.755
X8 – It would be easy for me to become skilful at using QR codes	0.372**	3.91	0.854
X18 – I would find QR codes easy to use	0.377**	4.03	0.665
Attitude toward QR codes	RA: Cronbach's $\alpha=0.899$		
X14 – The idea of QR codes is interesting to me	0.322**	3.93	0.831
X15 – I am positive about using QR codes	0.332**	3.88	0.896
X22 – Using QR codes is a good idea	0.375**	3.78	0.845
Intention to use QR Codes	RA: Cronbach's $\alpha=0.876$		
X5 – I intend to seek products or services info via QR codes	0.275**	3.32	0.891
X7 – I intend to use QR codes in the future	0.458**	3.71	0.980

X9 – I intend to recommend others use QR codes	0.375**	3.34	0.905
X10 – I intend to purchase products or services via QR codes	0.326**	2.90	0.99
X17 – I intend to use QR codes when shopping	0.287**	2.97	0.973

Notes: RA – Reliability analysis; (**) $p < 0.01$; (*) $p < 0.05$

5. CONCLUSIONS AND IMPLICATIONS FOR MOBILE MARKETER

The main goal of this study was to understand the motives of Portuguese consumers regarding the acceptance intention towards the QR code, as well as ascertain the potential contribution of QR code to mobile marketing practices. Findings indicate that from a consumer perspective, the frequency of use of QR code is relatively low suggesting that this new tool still has a limited impact on the mobile experience of Portuguese consumers. From the empirical study it seems that only a limited number of consumers recognize some utility of QR codes for mobile marketing and m-commerce. A large part of the consumers perceived the new technology as a code located in different media (magazines, flyers, posters) that could be used to access websites or social networks, achieve more information about products and services, and participate in promotional sales campaigns. The main barriers that constraints the use of the code are not functional reasons, but the lack of a mobile device and appropriate applications (apps) or mobile internet access.

Results show that campaigns based on the QR code have a limited influence on the consumer decision processes and on the individual determinants of consumer behavior. This suggests that the main role of the code on the consumer's decisions may be supplemental, and more specifically, for obtaining information about product and services features, prices and location. However, the information function might shape and reinforce consumers' positive attitudes toward brands, helping mobile marketers building brand awareness, change brand image or enhancing brand loyalty.

Another conclusion of the study is that QR codes are not seen by most of the consumers as a tool for shopping. Nonetheless, in the online shopping business the QR code can be an important tool for integrating multi-channel operations, enhance in-store connectivity and improve consumer shopping efficiency. The link between the QR code signage in stores with the mobile-supported online stores should allow consumers easy and fast access to the online stores via their mobile phones (Ryu, 2013).

In order to influence the process of QR code adoption by consumers this new technology should be used by retailers as an effective outlet for reaching out to new consumers and communicate regularly and cost-effectively with them. A mutual valuable practice that could improve the in-store efficiency is the inclusion of a QR code at self-checkout kiosks, linking them to a mobile payment system to make customer checkout faster, easier, and more efficient. As an added benefit to retailers, self-checkout kiosks of this type could also reduce cashier staffing needs and associated labor costs (Ryu, 2013). However, retailers should be careful in implementing the QR code in order to avoid their overuse in the store environment as the mass expansion of this technology could confuse the consumer shopping process (Ryu, 2013).

The increasing adoption of the QR code combined with mobile marketing practices provides a new channel of communication that could change the way firms communicate and engage with customers. Instead of focusing on the traditional campaign of simple mass communication marketers are now able to enhance communications by providing personalized, timely and location specific information without restriction of time and place (Smutkupt, Krairit & Esichaikul, 2010).

As already mentioned, QR code and mobile marketing could have a major impact in advertising and sales promotion (Leppäniemi, 2008; Smutkupt, Krairit & Esichaikul, 2010). Mobile advertising offers marketers the potential to promote products and services in a personalized and interactive way. Mobile sales promotions could be used to encourage the purchase of a product or service through flash campaigns where consumers can participate instantly or time-specific mobile coupons helping firms to manage product promotions more effectively (Smutkupt, Krairit & Esichaikul, 2010).

5.1 Limitations and suggestions for future research

A strong limitation of the study has to deal with the relatively small size of the sample and the overrepresentation of the female, younger and educated segment of consumers that could restrain the results extrapolation to the Portuguese market.

Future studies should investigate the effectiveness of QR Codes for digital marketing purposes using experiments to evaluate the impact of QR Code on consumers' buying behaviour on shopping, direct marketing and sales promotions; the role of QR Code on brand awareness and the strategies of consumer's acquisition, conversion, retention and engagement. Also, qualitative studies were needed in order to have a deep insight of the

use the QR Code on digital and mobile marketing and explore barriers and motivations that could inhibit or promote the adoption of QR Code.

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