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Applicability of QR Code (An Interactive M-Commerce Tool) in Indian Business: An Exploration

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Advancements in information technology have led to the proliferation of smart mobile phones. This coupled with more and more wireless information services, more mobile applications, better internet connectivity and changing customer profile has opened up new vistas for the organizations to interact with and create value for customers in the form of m-commerce. Further, cut throat competition, rising costs and reduced profit margins are forcing the organizations to look for new and improved ways to grab the attention of and interact with consumers. This paper is an attempt to appraise the potential of one such interactive tool i.e. QR (Quick response) code in providing innovative solutions in M-commerce with special reference to current Indian scenario.

Keywords: QR Code, M-Commerce, 2D Bar Codes, Interactive Marketing, 2DBar Code enabled mobile applications.

Introduction

We are now the part of mobile society, where people are always on the move, and while doing so they are managing their day to day affairs using a, now ubiquitous, device called mobile phone which has become the corner stone of our mobilized society. Primarily it was a device used for making and receiving calls while on move, advancements in IT and application of these in mobiles have turned these into smart phones. Now it is a machine with the features like internet, entertainment, multimedia facilities, camera and many more (Safaribook, 2012). The reach of mobile phones is tremendous to the extent that in developing nations, it may be the only option to engage someone digitally. With the introduction and popularity of 3G, 4G, Wi-Max, WI-Fi, WAP technologies, and the speed of mobile internet has increased and cost of surfing has decreased. This has led to the emergence of new opportunities for marketers to interact with and create value for consumers by M-Commerce.

M-Commerce, is a tool to bridge the gap between e-Commerce and in-store shopping, is one such opportunity which has fast emerged in the last two decades. Changing customer profile, increased competitiveness, mobility of customers, reduced profit margins have forced organizations to think of innovative ways to engage customers in M-commerce. One innovative and interactive tool is the usage of 2D barcodes in M-Commerce. This paper is an attempt to look into the applications and utility of a special type of 2D barcode i.e. QR Code in today's business organizations.

Objectives

1. To momentarily appraise the circumstances leading to emergence of M-commerce
2. To briefly review the evolution and growth of the 2D Bar Code/ QR code technology
3. To summarize the existing applications of 2D Bar Code and hence QR code in m-commerce
4. To analyze the applicability of 2D Bar Code/QR Code in current Indian business environment.

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Methodology

The secondary literature used, is extensively drawn from the in-house and proprietary sources available at their websites. The other sources include, research papers published in journals and news agencies portals etc. The data has been cross-checked and validated to provide the latest and unambiguous information. The data sourced from above has further been edited and categorized to make it suitable as per the objective of the study. The companies using QR code in their business system has been chosen by using convenient sampling. It is exploratory research in essence as this has been conducted to explore the possibilities of using QR codes in Indian Retail. This study is able to provide information to be used as hypothesis for further research.

Originality/value

The paper offers an accessible review of the current and potential applications of 2D Barcodes and QR Codes within M-Commerce, which will create the interest in academics working in marketing and information technology departments in universities and colleges and students studying in these disciplines.

The paper has been structured in to five sections. First section provides a brief overview of the factors leading to emergence and wide acceptance of M-Commerce as an accepted and effective way of information dissemination and making transactions with the customers. In the next section evolution, basic concepts, major types and characteristics of 2D codes have been discussed with particular emphasis on QR Codes. In the following section, applications of 2D barcodes, specifically QR codes, in M-Commerce have been discussed. Fourth section presents the applications and potential of 2D barcodes and QR Codes in India. The concluding section briefly explains risks, problems and future possibilities associated with the QR Codes.

Emergence of M-Commerce- An Appraisal

M-commerce or Mobile Commerce has come a long way since its inception in 1997 in Helsinki, Finland with the installation of two mobile enabled vending machines by Coca-Cola. Application areas of M-Commerce are now diverse ranging from Mobile ticketing, Mobile vouchers, Coupons and Loyalty cards, Content purchase and delivery, Location-based services (Local discount offers, Local weather, Tracking and monitoring of people), Information services (News, Stock quotes, Sports score, Financial record etc.), Mobile banking, Auctions, Mobile purchase, browsing to mobile advertising and marketing and many new applications are being experimented by the organizations and consumers alike.

Mobile Commerce is a business deal, through that ownership can be transferred and rights of purchasing goods and services can be used. The process can be completed by mobile access to internet networks with the help of mobile phone (Tiwari, Buse, 2007). Mobile Commerce can be taken as an extension of electronic Commerce and as such it has given the marketer an opportunity to create 'Bricks & Clicks' environment, using which retailers allow customers to harness the benefits of both shopping online (by making product reviews, information, and coupons available through mobile devices) and shopping in physical store simultaneously.

M-commerce services were used first time in the early 2000. According to ABI Research, by year 2009 the mobile commerce utility has increased triple times in US, but it is still a market of $1.2bn and by 2015, it may increase up to $ 119bn market. At the same time the M commerce market has exceeded $10 bn. Market by year 2009 (ABI research, 2010). It is being speculated that M commerce will become more secure by the time, and in result its market will exceed e commerce very soon (Techtarget, 2000).

So, what is leading to this staggering growth of M-Commerce? There are multiple factors which have propelled this growth individually and interactively.

Ubiquity, increased usability of mobile devices due to improvements in mobile technology (like increased memory capacities, better user interface, net enabled features, embedded multimedia tools, enhanced processing and computing facilities, video and audio applications), coupled with mobile internet and mobile applications in a single, easily portable device having the potential to access information anytime and anywhere, have made it convenient to shop from the palm of your hand. All these developments are the major driving forces which have revolutionized the way commerce was being carried out throughout the world. Cell phone is most admired and highly accepted machine on earth.

Advancements in communications technology is the introduction of 3G. It has made its presence in 143 countries in 2010 in comparison to 95 countries in 2007. Countries like Sweden, Norway, Ukraine and USA has introduced 4G technology. Wi-Max, WI-Fi, WAP technologies have facilitated better data and voice transfer rates and have enabled services like web browsing, video conferencing, e-Commerce applications and mobile TV. 90% of the world population is now having the access to internet. It is a device that integrates mobile phone capabilities with the features more commonly associated with PCs like internet applications, e-mail, entertainment, multimedia facilities, cameras and many more (Safari books, 2012). It can also be said that internet users have doubled from 2005 to 2010. 80 % of rural people are also having the access of internet (ITU, 2010). The subscription of broadband is growing with the rate of 45% for the last four years (ITU, 2009). Mobile broadband subscriptions are estimated to be the twice the number of fixed broadband users in 2011, which reiterates the tremendous potential for mobile internet (ITU, 2011). Start of i-Phones, made M-Commerce to move away from SMS systems and into real applications (Wikipedia, 2011).

Mobile Internet is growing stronger with more unlimited surfing packages. Low surfing costs and lesser fail rates coupled with the other improvements have led to the popularity of mobile internet and have increased both, the usage and the uses, of mobile devices and this has opened new possibilities for marketers to communicate with consumers as per time and place requirement.

Tough economic conditions have forced organizations to tighten their purse strings and lean towards new formats like mobile and internet which have opened new avenues for marketers, wherein they can target their exact audience with cheaper campaigns. But Mobile advertising should be made a part of the advertisers marketing mix. QR code created an opportunity for Cheil Worldwide, the Seoul based advertising agency, to combine the oldest form of advertising (outdoor) with the digital advertising and in results has developed an exciting media. QR Codes or text in a pull note for more information is the most gainful and competent key to engage the consumer within mobile advertising. Saldanha, 2011, advocated that" QR codes are turning out to be the perfect marketing package- a brief, compact, message driver and engagement tool- all loaded in one single code. The biggest advantage of mobile advertising is that you can interact with the right target audience in an interactive, creative and efficient way.

Another factor contributing to the fast rise of M-Commerce is the change in online behavior of the consumer. The young generation is surgically attached to their mobiles. Millennial appear to be born with their mobiles as they spend their days and nights living and thriving in virtual lands (The Economic Times, 2012).

Hence, QR Codes (2D Barcodes) as M-Commerce tool are an excellent way to engage with younger and tech savvy customers (Kelkar, 2012), Co-founder & COO of Hansa Cequity, a customer marketing solutions firm. Also, adoption and diffusion rate is much higher in younger population with highest usage of mobile phone being in 18- 29 years old age group. As per the ITU report, 2011, younger public work more online in than elder citizens throughout the world (ITU, 2011). Some of the early adopter of cell phone is Japan and South Korea (more than half of the population works on 3 G networks) who have also led to the fast emergence of M-Commerce in Asian markets. Japanese and South Korean population is more conversant with M-Commerce and it is growing very fast. South Koreans and Japanese are having the habit of making payment through mobile phones. 50 million mobile phone devices in both the countries are equipped with a Contactless Integrated Circuit (CIC) and customers use their phones as e-money, e-credit cards, train/plane tickets, membership cards and even door keys (Arias, Bourke, Truong, Daatel, and Egaan, 2009)

Evolution and Growth of QR Code Technology

Quick Response Code is shortened to QR code, is a kind of 2-D (two-dimensional) symbols having particular barcode type i.e. width of bars, character set, method of encoding, arrangement of bars and spaces etc. Jerry, Prakash, and Jagatesan, 2007, believed that it was developed in 1994, and is a registered trademark of Denso Wave Corporation consists of black modules arranged in a square pattern on a white background as shown in Fig 1 (a). The QR Code is one of the most popular types of two-dimensional barcodes being used in countries like United Kingdom, Canada, Japan, South Korea, Hong Kong etc. Primarily QR Codes were used to track vehicles during the manufacturing process.

2-D Bar Code technology has evolved from one-dimensional Barcode i.e. bar codes consisting of several bars of different width arranged parallel to each other and separated from each other by gaps (Andrea et al, 2011) technology or 1-D barcodes as shown in fig.1 (b) below.

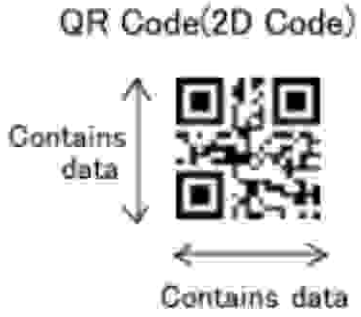


Fig .1 (a)

Fig. 1 (b)

(Source: www.denso-wave.com)

Bar codes had emerged almost 30-40 years ago. Barcodes are in visual format and their main characteristic is the information which is in readable format and can be easily read by hand-held barcode scanners. It can be stored, transferred, processed and validated automatically using IT systems. Barcodes provide a simple, fast, accurate and inexpensive way of entering data without exerting any physical effort to key in information using keyboard. The barcodes has propagated to almost all the industries across the world ranging from manufacturing, healthcare, food, retail, trade shows, Government, postal and to automotive

industry. 2-D Barcodes have higher storage capacity, higher error tolerance and extended storage possibilities. Due to their ability to meet the need to store large quantities of alphanumeric data, text, URLs, addresses and punctuation marks along with their ability to be printed in a smaller space, 2D codes became hugely popular with the organizations. For instance, EAN-13 code, a one dimensional code, can store only up to 13 characters, whereas a Quick Response Code can store up to 7089 characters (Andrea et al, 2011). From a technological point of view, now colour information can be used as a third dimension in 3D codes and 4D codes (Michael et al). With the advancement in technology, now QR codes can be customized by adding signature colours, and slowly can be made part of brand identity system (Saldanha, 2011).

2D barcodes can be generally classified into two types first is stapled 2D barcodes viz. PDF417 and code 49 in which there are several one-dimensional barcodes stapled over each other. The data is stored in these stacked rows which are read from left to right and from top to bottom. There are quite zones in the code located at the start and at the end of each row to help the scanner to identify which surface to be read and which not to be read.

Second type of 2D codes is Matrix or Arrayed barcodes, viz. Data Matrix, Aztec and QR Code. These barcodes store data both horizontally and vertically. As shown in fig.3. Three position markers define the direction from which the QR code is to be read. The scanner starts reading from the corner in which no position marker is placed. In comparison, in an Aztec code position marker is located in the middle of the code and scanning is directed from inside to outside (Andrea et al, 2011). Examples of the common 2D barcodes are given below in fig. 3.

Code 49 Data Matrix QR Code Aztec-code (RACO Industries)

Sources: Jerry et al, 2007 and Andrea et al, 2011)

Fig 3

The selection of a particular 2D barcode depends upon the application of the code, standard, implementation, data needed to be encoded and the way the code is to be printed. Each barcode is a standard that defines the printed symbol and how a device like a barcode scanner reads and decodes the printed symbol (Jerry et al, 2007).

Main features of four major 2D barcodes in summarized form:

Table 1 (Developing organization (Nation), Capacity, Main Characteristics, Features, Standards, Application areas of Major 2D Codes):

	QR Code	PDF417	Data Matrix	Maxi Code	Aztec code
Developing Organization (Country of origin)	Denso(Japan)	Symbol Technologies(USA)	RVSI Acuity CiMatrix (USA)	UPS (USA)	Welch Allyn Inc. (now Honeywell scanning and mobility) (USA)
Type	Matrix	Stapled Barcode	Matrix	Matrix	Matrix
Numeric	7,089	2,710	3,116	138	3832
Alphanumeric	4,296	1,850	2,355	93	3067
Binary	2,953	1,018	1,556		1914
Kanji	1,817	554	778		
Main Features	03 position markers, Large capacity, high speed scan, small print out	Large capacity, ideal for print outs	Very small print outs	High speed scan	1 position marker, applicable for all types of displays
Standards	AIM, JIS, ISO	AIM,ISO	AIM,ISO	AIM ,ISO	AIM, ISO
Application areas	Marketing, Mobile Tagging	Paper-based Tickets, Boarding Passes	Logistics and production	Logistics	Electronic Tickets and Boarding passes

(Source: www.denso-wave.com and Andrea et al, 2011)

Another important feature of 2D codes is their higher error tolerance relative to 1-D barcodes. High error tolerance or error correction facility, implemented by adding a Reed- Solomon code to the original data using Reed-Solomon error correction technique (Denso-wave, 2011), means that even the heavily damaged, polluted and low quality print outs codes can also be read correctly. This is because a 2D barcode contains same information four times redundantly (Andrea et al, 2011). For instance, a QR Code has four error correction levels (Level L-approx.7 %, level M- approx. 15%, Level Q- approx. 25%, Level H- approx. 30% (Denso-wave, 2011) to choose from as per the need of the environment in terms of the potential damage to the code and as per desired size of the code. Rise in error correction level is always accompanied by the rise in error correction capability and the size of the code.

Other specific features of QR Codes are omni-directional readability or 3600 high speed readability (because of 03 position detection structures), Kanji and Kana capability and structured append feature i.e. Information accumulated in numerous QR Code can be rebuild as single data code. One data symbol can be alienated up to 16 symbols, allowing printing in a narrow area (Denso-wave, 2011).

QR Code has been standardized by several international organizations like AIM (Automatic Identification Manufacturers) International (ISS0- QR Code, October, 1997), Japanese Industry Development Association (JEIDA-55 standard, March, 1998), Japanese Industrial Standards (JIS X0510 standard, January, 1999) and ISO International Standard (ISO/ IEC 18004). Micro QR Code was approved as JIS X 0510 Standard in November, 2004 (Denso-wave, 2011).

To read 2D Barcodes, imagers or camera scanners are a must as unlike 1D barcodes Laser or Charged Coupled Device scanners are unable to read these codes. Code is first captured by the imager or camera and then decoded using digital image processing and once decoding is finished, the stored information, either a website or text or picture or address or some other message, is displayed on the screen of the device (Andrea, Tobias, Pataki, et al, 2007). The smart phones with integrated camera, advance image processing and multimedia capabilities and along with the appropriate scanning software can be used as portable barcode encoding and decoding devices effectively.

Applications of 2-D Codes and QR codes in M-Commerce

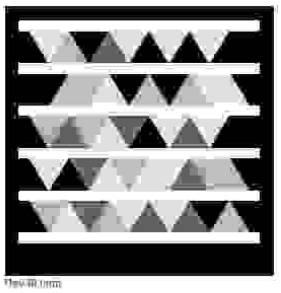
As Barcodes (both 1-D and 2-D) have been very effective in providing solutions in traditional commerce systems throughout the world for the past 40 years, organizations have started to look forward to more innovative solutions using the barcodes. Advancements in information technology and resultant and other advancements in mobile industry like smart phones have made it possible for the user to access more and diverse information without exerting more efforts unlike in the past and hence industries have started to pay more attention to barcode applications in e-Commerce and M-Commerce.

Some of the popular applications of 2D barcodes have been discussed in the following sections; however, it is pertinent to mention that because of their specific features, different situations warrant the use of appropriate codes as per the demands of the situation.

2D barcodes are being used as a cost-effective advertising and marketing tool by the organizations and advertisers alike. This is done through Mobile Tagging- the process in which a code is scanned using a smartphone or some mobile device and then information stored in the code is displayed on the screen of the device (Andrea et al, 2011). The information may be text related to product, a phone number, a VCard contact or a web link to company's website. Mobile tagging is generally done through QR Codes as they are easy and fast to scan and can store more information. These QR codes can be combined with traditional print media and thereby an automated connection between physical reality and virtual content is created. When the customer likes the product, he can obtain more information about the product, can engage in two way interaction on his volition and can even complete a transaction just by scanning the code placed in the media say a poster or journal or newspaper using his smart phone and appropriate and required software/ mobile application. In February, 2010 "The Weather Channel" (American broadcasting channel) advertised its Android based application by using QR Codes on TV, thereby emphasizing the fact that QR-Codes are not restricted only to paper-use (Andrea et al, 2011). 2-D Codes can even be branded and personalized by the use of colours and shapes and company's logo in the code as shown below in fig. 5. (on next page)

Leading retail brand Tesco has created virtual stores or online mall called Home plus at subway stations in South Korea to make shopping convenient for customers using QR Codes. The display at these stores is exactly like the display at actual stores, except that Smartphone

(QR Code of Sparkasse with logo)



(Microsoft Tag)

Source: (Akram, 2009)

Fig. 5

are used to shop. Customers use their smart phones to scan QR codes in these virtual stores and the product automatically lands in their online shopping cart. Once the transaction is complete, the product is delivered to the customer at his door step the same day (Saldanha, 2011). Use of QR Codes in mobile tagging is much prevalent in Japan and South Korea among Asian markets, though India and China are also emerging as the potential markets for these codes.

By using QR Codes, organizations have been able to digitally enhance their physical objects and places by the way of hard linking or objects hyper linking. Michael and others identified the same potential of QR Codes by using QR codes to provide more information about the souvenirs and physical historical objects in their study at Mercedes-Benz Museum. By encoding a Phone number or SMS or E-mail, QR Codes make the organization more approachable to customers. Organizations can transfer contact data in the form of VCard through QR Codes for future use of customers. The use of QR Codes at historical places can facilitate the tourists immensely by obviating the need of duping tourist guides. Frankfurt and Vienna for select historical and cultural places to extend static information to real-location based service (Michael et al).

QR Codes used for encoding hyperlinks can provide additional and relevant information about the product, which otherwise cannot be disseminated due to product design or size. In Japan QR Codes are attached to fruits and vegetables to give information about their source, packing date, used pesticides, and even recipes (Jfs, 2004). Geo tagged QR Codes are used for collecting relevant marketing research information about the geographical location of the customers and hence a customized advertisement system can be effected based on local geographical information (Dow, Lee, Liao Yang, Koo, 2011). This can be done either by adding geo information to your code (using API) or by using GPS and cell tower triangulation (Geo Tagged QR Codes).

The 2D code PDF417 is most suitable for printouts because of its powerful error correction features and no restrictions in terms of space and size on paper (Andrea et al, 2010) as in case of mobiles. This code is being used for paper based tickets and boarding passes, driving licenses, Identity cards (QR identity cards) etc. QR code has been used and printed on Chinese train tickets since late 2009 (Wikipedia, 2012).

Use of QR Codes in mobile ticketing or electronic tickets and boarding passes is an accurate, faster, more convenient, less costly, environment friendly and paperless alternative to paper based tickets as it takes considerably much lesser time to scan and read a 2D code comparative to manually keying in information.

Such tickets are currently being used by German Railways Deutsche Bahn, Lufthansa and Swiss railways Schweizerische Bundesbahnen and Deutshe Post. Aztec Codes are the most appropriate for mobile ticketing and boarding passes because of their unique readability from centre to outside. In mobile ticketing, passenger receives a code on his mobile, representing his ticket, instead of scanning one on his own. This code has an embedded link to a website where his ticket has already been forwarded. He can travel paperless as 2D code delivered to him can be read using scanners (Andrea et al, 2011).

Mobile Coupons, a novel, fast, efficient, and highly cost effective way of persuading the customers, is yet another application area of QR Codes. Also, mobile coupons are redeemed more often than traditional coupons, though these are often complementary to traditional coupons, thereby lending more effectiveness to the marketing program. Mobile coupons in the context of M-Commerce can be taken as marketing information, transmitted to the customers through mobile phones, which offers the customers either discounts or some free goods or services. In India, Cotton world, a leading apparel brand used QR codes in October, 2011during the festive season of Diwali to push sales. Customers were required to pick up QR code cards at the outlets and when they scanned these codes with their smart phones, they were entitled for offers on the merchandise they purchase (Saldanha, 2011).

Yet another application of QR codes is in the area of Logistics and Production. For instance, for quality control, 2-D barcodes labels can be attached to important components affecting safety for appropriate assembling of these parts (Omronap, 2012). Generally the Data Matrix code, due to its readability even in small sizes, is used in production -oriented industries for transferring large volumes of data related to product to machine readable format. The major application of these codes is in marking of electronic modules. Logistics is another area where Data Matrix Code is used frequently. German Parcel service Dutsche Post AG is a heavy user of Data matrix Code (Andrea et al, 2011). Product information tracking and checking, mobile security, mobile customer identification, product verification are the other application areas of QR Codes (Jerry et al, 2007).

Application of QR Codes in India

Use of QR codes in India is in nascent stage in comparison to other World Markets like Japan, South Korea, Europe, America, Canada etc., but slowly and gradually Indian organizations and customers liking is warming up to the utilities of QR codes. The fact gets endorsement from ubiquity of QR Code in print media nowadays. Google Trends report on QR codes puts India among the TOP 10 countries at no. 9 (The Times of India, 26th February, 2012).

In India, QR codes are being successfully utilized by many organizations. In 2010, Car maker company Ford, is one of the pioneers to use QR Codes in India. Ford used QR Codes in its advertisements in leading newspapers to promote its Ford Figo model. Readers could play a video of Ford Figo video provided they download an application on their mobiles and thereafter scan the code. Food, hospitality, retailing, automobiles, telecom industry are the early adopter of QR code technology in India. (Saldanha, 2011). Jet airways is using QR Codes in its in flight magazine to help the passengers to download flight information, sector details and other useful data. More and more organizations both Government, as well as private are using QR codes in their advertisements and asking customers to scan these codes to get more information about the organization e.g. MSTC LTD, (a Government of India enterprise) (The Economic Times, 2011), Godrej's social networking site GoJiyo, Taj Hotel's holiday packages

branded Safari, Hybrid retailing format AaramShop, Jaypee Greens, Blackberry, which used QR codes for its BBM (Blackberry messenger) to showcase the ease of adding friends via a QR code (Saldanha, 2011). MidDay Tabloid used a QR code to give the readers access to its multimedia content. CyberMedia, specialty media company with magazines like PCQuest, Voice and Data has started using QR Codes from March, 2011 edition to link the reader to videos, web pages, reader contests, advertisements, discount for subscriptions, events etc. through QR Codes printed in PCQuest Magazine. (Lakhina, 2011)

Though the use of the QR codes in Indian markets is at infant stage, as most of the time it is restricted to bring consumers to visit the website for more information on product or usage tips or on coupons. The two-dimensional codes have tremendous potential in Indian Markets as more and more smartphones make inroads. Consumers want immediate access to time related critical services like information regarding train and flight schedules, stock market prices etc. and QR codes can be an instrumental in that. QR codes can give the additional facility to customers to buy goods and services as and when desired. India's fast growing e-commerce market, boosted by better internet connectivity and the changing customer profile (internet usage friendly customers) further endorse the potential of QR Codes in M-Commerce in India. According to a report "India Goes digital" by Avendus Capital, 1 crore 3G connections were taken within 06 months of start, roughly equivalent to the bottom of wire line broadband connections. 28% railway tickets are reserved online out of that 117 million dealings are done on Indian railways' portal alone. 47 % of the classified business in the country is online. 7% of bank users in India access their accounts online. Around 50% of music revenues in India comes from mobile downloads. It is estimated that, 4G is projected to achieve a 9% penetration globally by 2015, and is likely to translate into 28 million connections in India by 2015. Mobile broadband is anticipated as the main component of overall Internet diffusion in India with 3G to reach 22% of the population by 2015. Apart from this, Govt. of India's initiatives (viz. National e-governance Plan, National Broadband Plan 2010, UID etc.) coupled with efforts of private players (ITC's e-choupals, Nokia lifetools, eFarm etc.) to reduce the rural urban digital divide are also increasing the scope of m-Commerce in the country.

For utilizing QR codes, it is mandatory to have smart phones. Indian market has seen dazzling growth of internet in the last few years and we have also seen the emergence of innovative tools like QR codes to provide immediate access. With the reduction in prices (available at Rs. 3,000/- already) acceptance of smart phones is growing at a fast speed. McKinsey has estimated the use of smart phone in India is 450 million by 2015 (Bhinde A, 2012)

But the flip side of the story is that most of the people transacting online are doing so in respect of those transactions in which physical delivery of goods is not involved. While e-tailors are trying to reimburse this by offering additional concession, but major products selling online are books, assistance and electronics (Sethi, 2012). Industry experts are hopeful that such inhibitions shall be shed by consumers in future. Untapped and non penetrated small town India, with all its aspirations and spending power and no access, is being seen as a big opportunity for the growth of online shopping and M-Commerce in future. QR codes can help these people in remote areas by creating virtual reality for them. Even, illiterate people can use and scan a QR code to get information from government authorities, which in this case can be a voice message in the local language. But for this to implement successfully, payment and delivery mechanisms should be robust and secure.

QR codes can be used successfully to create Seoul like experiences of virtual shopping in the Indian cities, especially, Metro cities to help customers (to avoid traffic hassles, to save time and to facilitate tech savvy younger generation working till late in offices and spending long hours in commuting) to get things done in their day to day life .

It might be a while before marketers as well as customers fully integrate and adopt QR codes into their everyday experience but seeing the tech savvy young population, time constraints on young working population, high adoption and diffusion rate of newer technology, change in online purchase behavior of the customers coupled with Governments and private players' initiatives, economic growth, other social and cultural changes, it appears almost certain that this interactive tool of marketing is here to stay.

Conclusion

All is not well with QR Codes. With increase in popularity of QR Codes, scammers and hackers are on lookout to steal your personal information or corrupt your Smartphone by attagging i.e. attack tagging using malicious QR Codes (Attaging, 2011). Kaspersky Lab, first one to notice QR Code tempering in Russia in 2011, has issued warning in this regard (Wasserman, 2011). Such codes are easy to prepare and are affixed over legitimate QR Codes, but when scanned, it lead users to a malicious URL or may install a nastyAndroid malware on their phone. Unsuspecting user may reveal sensitive information related to individual and financial identity to Cyber criminal through web pages taking these to be of some genuine advertisers (P C World, 2011). User may also permit the use of camera, internet, and other applications on the phone unknowingly, which in turn may lead to analysis of user's sensitive data, may lead to identity theft, changing of privacy settings etc. Few companies with IBM are researching with speech recognition software to ensure the security in M-Commerce deal (Tech target, 2000).

Apart from realizing full potential of currently available 2D codes both by consumers as well as organizations, there is a need to considerably amplify the memory capacity and error rectification capabilities of 2D barcodes (Andrea et al, 2010). With the influx of new simplified and more innovative technologies permitting and enabling the use of barcode without barcode scanners and other devices but simply with a camera, a whole new world of possibilities for 2D barcodes will open up. At present Microsoft is effective on one such technology to overcome counterfeit document issues (Akram, 2009). Change in consumer habits regarding more active usage of their mobile phones for gathering information needs to be effected. This can be realized by making more powerful mobiles available at cheaper rates. Organizations are already working in this directions, for instance, on 27th February, 2012 Nokia introduced a range of new windows smart phones, services and partnerships at Mobile World Congress. These smartphones are aimed at the younger generation and being introduced at reduced prices by Nokia (The Economic Times, 2012)

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