Technology Adoption of QR Codes in the Indian Scenario: An Empirical Analysis

Malathi Sriram
Associate Professor - Systems
SDMIMD, Mysore
malathi@sdmimd.ac.in

Abstract

Quick Response (QR) codes have origins that link to barcodes/ UPC (Universal Product Codes) labels. Barcodes were originally designed to speed up the purchase process at the Point-Of-Sales terminals and keep track of inventory. QR codes were developed as a replacement to barcodes and offered a technological advantage over them in that they could store much more information. The paper aims to identify who stands to benefit the most from QR codes and what strategies they need to implement in order to do so. In order to answer that question, one must understand that the main use of QR code technology and how it has evolved and changed due to the diffusion of another technology. When QR codes were created in the early 1990s, very few people carried QR code scanners. Even though very few realize, many people carry one in their pocket. The rapid proliferation of smartphones allow most of their owners to read QR codes as either a built-in feature, or through a simple app download. As a complementary technology, the smartphone has achieved rapid market penetration, which has moved QR codes from a fairly dormant technology to a commercially viable technology. The diffusion of the smartphone has led to widespread applications for QR codes

and rapid diffusion throughout the market. The focus of this paper is to analyze the diffusion of QR codes and answer the following question: ***Is there a rapid diffusion of QR codes who is best positioned to take advantage of this diffusion and who stands to lose out?*** *The question will largely focus its answer keeping mind the Indian context and scenario.*

Keywords : *QR code, Techonology Adoption & Technology Diffusion.*

Introduction

Watching a pixelated graphic below an advertisement billboard makes one wonder what is its need? It is a QR Code. Scan the QR code on the billboard and watch a video to learn about its feature (Dobbs, 2011). Looking for that beautiful jewellery that you just saw in a magazine? Scan the QR code in the advertisement to find retailers near you. Developed and popularized in Japan, these Quick Response (QR) or two-dimensional barcodes allow marketers to provide interactive content in an otherwise static environment. QR technology is most effectively used in situations where one wants to add a dynamic component to communication that would otherwise be non-interactive.

This is an *exploratory* article that attempts to find the awareness (*Knowledge*) and perception (*Persuasion)* about QR codes in the industry for the purpose of advertising, marketing and promotions a firm's products and services. Ultimately other firms need to decide whether to utilize this technology or not. The article also explores the role of end user in the adoption of technology from the

perspective of innovation diffusion theory. The study is based on empirical data from secondary sources – Internet, Journals and white papers on QR code. This study attempts to bring forth the details of why organizations adopt new technologies, such as QR Code, and the services (and products) offered by the organization that can be brought under the umbrella of QR Code. The issue will be mainly addressed keeping mind the Indian context and scenario.

What is QR Code?

Quick Response (QR) code or "2D" barcode that can be read by downloadable smart phone readers with camera-scanning capabilities was introduced in Japan in the year 1994. A subsidiary of Toyota Inc - Denso-Wave Inc (Eby, 2012), an auto parts maker used the QR code to tag its manufactured auto parts. QR code is similar to barcode; but QR code is better than barcode for the simple reason that it can include text and numeric as opposed to only numeric in barcode. The QR code has the encoded text, numeric and other characters in the form of pixels. A typical QR code (Lyne, 2009) looks like *Figure 1*.

Figure 1: *Sample image of QR Code*

It is an unusual-looking, black-and-white, pixel-like design that makes the QR Code. QR Code can be scanned by a mobile cell phone camera to take a piece of information or to access the information source, either to store or use it further for a different purpose. The mobile needs to have a small application – such as *Kaywa* – for scanning the QR code. QR code is one of the popular methods to scan for information. QR Codes are often seen in an advertisement in a magazine, on a billboard poster, a web page or even as graffiti on apparels (Lyne, 2009). Once the cell phone scans and reads the code it can give details about the advertisement, about the web page service or about the business in general or display a website link to watch the latest movie's teaser trailer, or offer something for free! While the frequent use of QR Code is for storing the web link of the advertised product or service and guiding the user directly to the webpage / website. QR codes are also used for storing information such as phone number, address, qualification etc., on to a mobile device; download contact details (VCARD), dial telephone number, send an email, view a social media profile or to send a text message (HSW solutions, 2000 - 2011). Some of the applications are presented in Figure 2.

Visiting Card

Ad in Magazine

Event & Product Promotion Product Description

Figure 2: Core Application of QR Code

The recipient or the user of the information decides how to use the data. The mobile devices that can read the QR code from the scan application (app), need not always be connected to the Internet to save the coded information, nonetheless an Internet connection is necessary to follow a URL that connects to a web-based content.

There are many other applications (AT&T, 2010) apart from Kaywa that scans or reads QR code. The application that reads/scans QR code on Apple is RedLaser. On the Android platform the application is QR Droid. The end-user requires scan application such as the one mentioned above, while the QR codes can be created using certain other applications that are freely downloadable. The use of QR codes is license-free. They come in different sizes of pixel matrix called versions. The largest are 177 x 177 pixels. The smallest QR codes are 21x21 pixels, (Eby, 2012). The 21x21 pixel size is version 1, 25x25 is version 2, and so on. The 177x177 size is version 40.

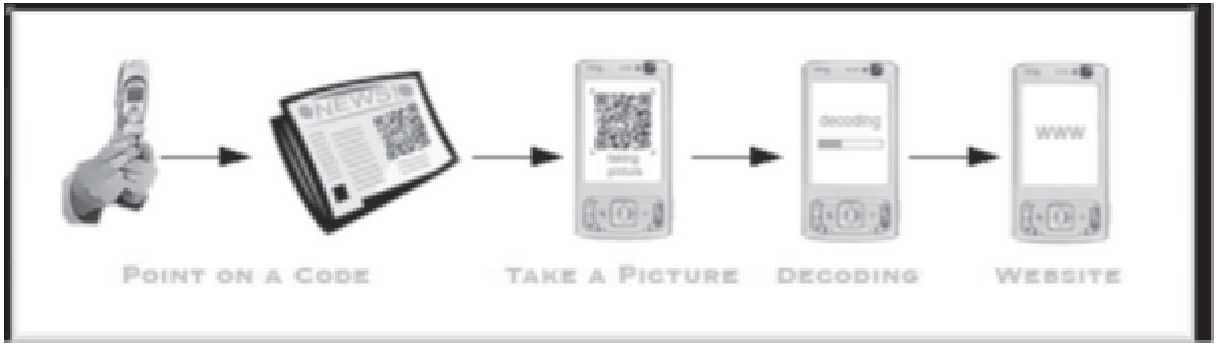


Figure 3 : How does the QR Code work?

To create a meaningful and interactive customer experience, QR codes can be programmed to start up applications such as web browsers, IM, email, SMS and even streaming video. QR codes hold promise in various arenas, perhaps, the most exciting being the various applications they have in the social media space.

Technology Diffusion and Adoption

While QR codes have their origins and high adoption in the USA, Canada, United Kingdom and Japan, they currently have not yet diffused as rapidly in countries in the European continent and India. While there have been certain U.S. based survey reports indicate contradictory (Fredricksen, 2012) usage of QR codes (London, 2013).

In terms of Geoffrey Moore's Technology Adoption Life Cycle (Moore, 2002) framework, the use of QR codes- specifically in the U.S.—is most prevalent among early adopters who appreciate the benefits of the technology, but are not technologists. As the benefits of the technology become more widely understood, one presumably will begin to see QR codes cross the "chasm," which, as Moore states, is the "most formidable and unforgiving transition" in the Technology Adoption Life Cycle. These early adopters want to be a "change agent" to get ahead of the competition, whereas the early majority will wait until QR codes provide a meaningful productivity improvement for existing operations.

In India, it is reported that the early adopters of QR Code were those who, surprizingly, came from the food and

hospitality (beqrious.com, 2013) industry. There is evidence to suggest that the use of QR codes is starting to gain momentum in India. The Google Trends report on QR Codes puts India among the Top 10 (India, 2012)countries at No 9. The possible reasons for this impetus may be: (1) the Indian market is embracing a complementary technology that enables the accessibility and adoption of QR codes easier; (2) QR codes are free to create and to use; and (3) there are many creative uses of a QR code that make it a very versatile technology.

First, the catalyst that will help accelerate the adoption of QR codes in the India is the smartphone. The smartphone (mobile phone with a built-in camera and/ or the ability to download apps) is a complementary technology for QR codes, because, it serves as the QR code reader, which makes the interaction with consumers—such as the ability to provide information—possible. As this complementary technology has diffused and gained a late majority, it has paved the way for the QR code. In India, the penetration of cell phones is very high. India is the world's second-largest mobile phone user with over 900 million users in the world. Of these the smartphones are 44 million (Pressroom, 2012). Nielsen reports that the year-on-year growth of smartphone subscribers in India stands at 52 per cent. It is one of the fastest growing market for the smartphones.

This rapid adoption of smartphone technology means that a large number of people are going to tap into new uses for their phones that was previously lacking. As a demanding and attentive audience for a new technology,

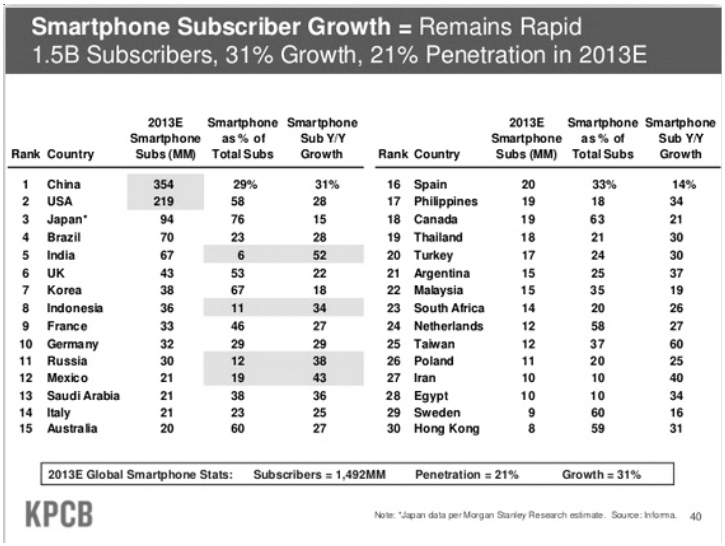
Figure 4 - Source: *(News, 2012)*

Position		Country of Origin	% of Global Total		% Increase	
Q1 2012	Q4 2011		Q1 2012	Q4 2011	Q4 11 to Q1 12	Q1 11 to Q1 12
1	1	United States	48.1%	49.0%	14%	314%
2	2	United Kingdom	12.1%	11.9%	18%	644%
3	3	Canada	5.1%	5.3%	13%	298%
4	4	Australia	3.5%	3.7%	10%	565%
5	5	Germany	2.4%	1.9%	47%	561%
6	7	India	1.8%	1.6%	25%	500%
7	8	Denmark	1.7%	1.6%	25%	439%
8	9	Mexico	1.4%	1.5%	12%	935%
9	6	Netherlands	1.4%	1.7%	-6%	202%

10	12	Singapore	1.0%	0.9%	30%	564%
11	11	France	1.0%	0.9%	24%	229%
12	10	Malaysia	1.0%	1.1%	2%	943%
13	15	Spain	0.9%	0.8%	33%	338%
14	14	New Zealand	0.8%	0.8%	16%	721%
15	13	Norway	0.8%	0.8%	8%	969%
16	16	Brazil	0.7%	0.8%	6%	444%
17	17	Italy	0.7%	0.7%	17%	135%
18	14	Sweden	0.7%	0.6%	38%	463%
19	26	Turkey	0.7%	0.5%	59%	579%
20	20	Israel	0.7%	0.6%	24%	702%
		Total	86.4%	86.6%	16%	381%

smartphone users are keenly waiting to learn about smart and clever ways to utilize their new device. As a complementary product, smartphones will kick-start the adoption of the once dormant technology and speed the diffusion of QR codes.

Secondly, QR codes are free to generate and free to read. Thanks to Denso Wave, and a plethora of companies, including AT&T, anyone can generate a QR code for free. Additionally, anyone can easily track the number of times their code has been scanned. This information effectively measures the usefulness of their code. If, a business were to include a QR code on their advertisements and offer a promotion, they can easily track the usefulness of the QR code.



Smartphone Subscriber Growth = Remains Rapid
1.5B Subscribers, 31% Growth, 21% Penetration in 2013E

Rank	Country	2013E Smartphone Subs (MM)	Smartphone as % of Total Subs	Smartphone Sub Y/Y Growth	Rank	Country	2013E Smartphone Subs (MM)	Smartphone as % of Total Subs	Smartphone Sub Y/Y Growth
1	China	354	29%	31%	16	Spain	20	33%	14%
2	USA	219	58	28	17	Philippines	19	18	34
3	Japan*	94	76	15	18	Canada	19	63	21
4	Brazil	70	23	28	19	Thailand	18	21	30
5	India	67	6	52	20	Turkey	17	24	30
6	UK	43	53	22	21	Argentina	15	25	37
7	Korea	38	67	18	22	Malaysia	15	35	19
8	Indonesia	36	11	34	23	South Africa	14	20	26
9	France	33	46	27	24	Netherlands	12	58	27
10	Germany	32	29	29	25	Taiwan	12	37	60
11	Russia	30	12	38	26	Poland	11	20	25
12	Mexico	21	19	43	27	Iran	10	10	40
13	Saudi Arabia	21	38	36	28	Egypt	10	10	34
14	Italy	21	23	25	29	Sweden	9	60	16
15	Australia	20	60	27	30	Hong Kong	8	59	31

2013E Global Smartphone Stats: Subscribers = 1,492MM Penetration = 21% Growth = 31%

KPCB

Note: *Japan data per Morgan Stanley Research estimate. Source: Informa. 40

Figure 5: Smartphone Adoption in Countries across the world *(Mary & Liang, 2013)*

Thirdly, with a QR code one is not at all bound by the amount of advertising that can be displayed. Traditional advertising forces fee payment for additional space for magazines or airtime for TV. By attaching a QR code, a consumer can read all the information that company wants to provide them with for no additional charge. Perhaps the company would want to show a consumer a video advertisement for their product. By providing them with a QR code, the consumer can be directed to company's online video advertisement without the advertiser incurring any additional expense. The creativity behind QR codes can be exploited to any extent with the limitation being only imagination. For example a QR code can be designed to link to Facebook and its "Like" feature thereby encouraging users to just scan a barcode and "Like" something rather than log into Facebook, find a product, restaurant or concept and then click on the "Like" button.

What is important to note is that a technology can change as it diffuses. The original use of tracking inventory, as intended by Denso Wave, is no longer the primary use of QR codes. Those who view the QR code as a glorified means to track inventory will lose out on its potential as an interactive marketing tool.

Companies that are Best Positioned to Leverage QR Codes

At this point in the Technology Adoption Life Cycle of QR codes, many firms have begun to leverage the technology across many different applications. Companies concerned with targeted mobile advertising have and will find QR codes particularly interesting.

JetAirways was one of the early adopters of QR Code which enables their guests to seamlessly access new and additional information about JetAirways (JetAirways, 2012) offerings using their smartphone. Scanning the QR Code available on the the in-flight magazine of JetAirways, Business cards, Press advertisements, redirect the guests to the JetAirways mobile site (*m.jetairways.com*) which will have the information that the guests seek.

Starbucks is another prime example (Crunch, 2010) of a company that is leveraging QR codes in an innovative way and will benefit from proliferation of the technology. Starbucks had created a mobile application to enable iPhone-carrying coffee drinkers to pay for their favorite drink via an app. Owners of Starbucks gift cards enter their card number into the app and then when they are ready to pay the application generates a QR code that is scanned at the point of sale (POS). Users of this application will benefit from not having to carry around (or lose) gift cards and Starbucks will benefit from having more behavioral data about the user that they are bundling in their QR code. This behavioral data is a huge asset for a global company like Starbucks. They now have a mobile application that enables a dynamic way to interact with the consumer and gives them an additional channel to offer targeted advertising. For example, Starbucks has the ability to create customized offers and messages (e.g., time of day, favorite drink, favorite location, etc.) that aim to increase a customer's loyalty to Starbucks and overall lifetime value (LTV).

Shoppers Stop (Lalwani, 2012), in India is using QR Code for interacting with its customers. During a festive or sale

season is always a challenge for a brand to stand out and achieve enormous sales target. And if one look at any newspaper you will see almost every brand advertising about the sales promo. So how did a brand like Shoppers Stop stand out? The solution was to use QR codes effectively and then start conversations with their customers and delight them in an interesting fashion. Shoppers Stop placed a QR code in the print ads and on scanning the QR code the user was asked to install an app called 'Shoppers Stop secret' and then see the magic. With the help of this app, readers could trigger an augmented reality set-up in which they could view certain 'secret offers'. These offers were not printed specifically in the newspaper ad, hence in order to see them one had to download the app.

In each of these examples, the continued widespread adoption and use of QR codes becomes more and more of a reality as the adoption of smartphones increases.

QR Codes – Use it 'Right'

a) Link the QR Code to the Firm's Mobile Website

People scan QR Codes with their Smartphones (QRE, 2010)Therefore, it must link them to a mobile website. If it is linked to a Desktop website the experience will not be great and opportunity will be lost.

b) Use a QR Code that can be Tracked

Any firm would want to get a return on mobile marketing investment. The QR Codes can have an additional

feature - a tracking mechanism for previously un-trackable static print such as direct mail, newspaper ads and even television commercials. This gives the statistics of how many times the QR Code was scanned.

c) Print the QR Code Big enough

While one can understand the ad print rates are sky-rocketing, printing a too small QR code would not work. At a minimum it is the recommended the QR Code be printed no smaller than1"x1". The QR Codes are used to attract attention of the customers and differentiate the firm. Therefore, bigger the better!

d) Use A short URL

The longer the URL the more pixilated the QR Code will be. The more pixilated the QR Code is the greater chance it will not scan (especially at smaller sizes). Use a URL shortener to graphically simplify the QR Code ensuring it will have a high scan rate across devices and consumers.

e) Display the Short URL with the QR Code

Always embed a short URL into the QR Codes. Many mobile phone users may not have a smartphone and thus cannot scan the QR codes. The firm has essentially lost out on those prospective customers. Therefore, always makes sense to include the short URL next to the QR Code for those who do not know how to, or simply are not interested in scanning the code. By including the short URL access to everyone is provided.

f) Place the QR Code in Internet Accessible Environs

This is simply common sense. One sees the QR Codes displayed in metros stations that are underground, here the internet access might not be high. If, a successful scan requires an internet connection, then make sure there is one available.

g) Other Competing Standards

As with any technology there will be winners and losers. There are many alternatives to QR codes in the marketplace that may become the losers in this space, if QR emerges as the leading barcode technology standard. *Figure 6* provides a side-by-side comparison of some of the competitors and variations of QR codes.

Figure 6: Competitors and Variations of QR Codes

This graphic paints a picture of the competitive landscape and highlights how QR codes are in the midst of a "standards war" in the U.S. market—similar to the days of the infamous browser wars. Data Matrix, Microsoft Tag, and EZ Codes, which have received the most attention as technologies in the U.S., are examples of alternatives to QR codes that will be briefly explored here.

Data Matrix was developed in 1989 just five years before QR codes. While Data Matrix codes initially developed some momentum, they have some serious shortcomings that QR codes have successfully overcome. First of all, Data Matrix codes can store roughly half the amount of (QRE, 2010) data as QR codes (2,335 alphanumeric characters versus 4,296 for QR codes). Next, Data Matrix codes do not support Kanji (Japanese) character sets, which contributed to the rapid adoption of QR codes in Japan. And while Data Matrix codes are considered more secure due to their encryption standards, the lack of Japanese support early on was the major factors for why QR codes have leaped ahead. In short, these negatives add up to a losing situation for Data Matrix codes.

Microsoft is offering their own 2D code (Murphy, 2010) to compete with QR codes, which they call Microsoft Tags (Sprague, 2010). Microsoft Tags have advantages and disadvantages when compared to QR codes. One main advantage is that Microsoft Tags include code expiration, which is useful for time-based promotions or discounts. Additionally, the tags can include GPS information about the scanner, which would send that data back to the publisher for analytics tracking. Furthermore, the tag ecosystem is supported by Microsoft's wide array of technology resources and product offerings related to the digital advertising industry. On the flip side, a major disadvantage of the Microsoft Tag technology is that the user must connect to a Microsoft server and offline usage is not possible with this system. Additionally, as Microsoft

inserts a layer of technology tracking between the customer and the publisher, the tags themselves are harder for the readers to decode if they are viewed from an angle.

Finally, EZ codes are yet another competing standard that are likely to lose out if QR codes become the standard. EZ codes are similar to Microsoft Tags in that they are proprietary and not in the public domain. QR codes are public and therefore have been put through a certain amount of scrutiny by the technology community. With proprietary codes, the user is held captive by the maker of the code. Only the owner of the code can provide codes and reader applications. For these reasons, EZ Codes will likely end up in the loser category of 2D barcodes.

Concluding Observations

QR codes will provide value to firms in many different ways. Froman investor's point of view, the firms that have a strategic vision and take an innovative approach in using QR code technology will certainly benefit in the long-run. Marketing initiatives that support consumer interaction and the subsequent feedback loop (research and technology) represent a strong value proposition for firms looking to distinguish themselves from competitors. Shoppers Stop is a great example of this approach through their application of QR code technology in overall branding operations.

As an investment opportunity, the smaller firms stand to gain directly from QR code diffusion. Companies whose business model is directly tied to the diffusion of QR codes stand to benefit the most, and as such, become more attractive investment opportunities as diffusion improves.

Finally, the investor is encouraged to maintain a sceptical eye on the competition. There are advantages to the competing standards mentioned above however there are many disadvantages as well. At this point QR codes are getting the pull and seem well positioned to become the standard but once the "chasm" is crossed one will know for sure.

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