USE OF QR CODE: A STEP TOWARDS DEVELOPMENT IN INDIA

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Abstract -*Since the usage of smartphones had rapidly expanded, several companies across the world-wide had begun using the QR code as advertising tool. These square-shaped barcodes have been around for more than two decades but recently have got entry into customer based engagement activities for instance in newspapers, magazines, libraries, public advertisements, business advertisements, foods, drinks, restaurants, clothes store, social network applications, enterprises, and public based Government activities. Now it is widely popular in Western and few Asian countries such as Japan, Korea, and China, but QR code marketing is in a budding stage in India, therefore basic knowledge relevant to QR Code needs to be acquired by individuals and organizations. Thus the main objective of this article is to review concept of QR code, structure, technological pros and cons and finally common use cases in India*

Key Words: QR Code Concept, QR Code structure, QR Code Function, QR Application, Smartphone.

1. INTRODUCTION

QR Code means Quick Response Code, which was invented by Denso Wave in 1994, a subsidiary of Toyota Japanese corporation. It is the trademark for the type of matrix barcode. QR code is defined by the ISO/IEC 18004 industrial standard. Normal barcodes had information stored in horizontal dimension only and were limited in the amount of data they could contain. Denso Wave developed this QR code as a way of holding information in both horizontal and vertical dimensions; hence a QR code is able to accumulate 10 times more information than a normal barcode. Statistically, QR codes are capable of symbolizing same amount of data in approximately one tenth of the space of a traditional barcode. Information such as URL, SMS, contact information and plain text and videos can also be embodied into this two dimensional matrix.

1.1 STRUCTURE OF QR CODE

QR code looks like a small box which includes a random series of black and white pixels. Even though QR code is a tiny symbol. Currently, various versions of QR code (from Version 1 to Version 40) are freely available along with decoding applications. QR code consist of different areas that are reserved for specific purposes version 1 does not contain all these areas. Therefore, we refer to version 2 of QR code(Figure 1).
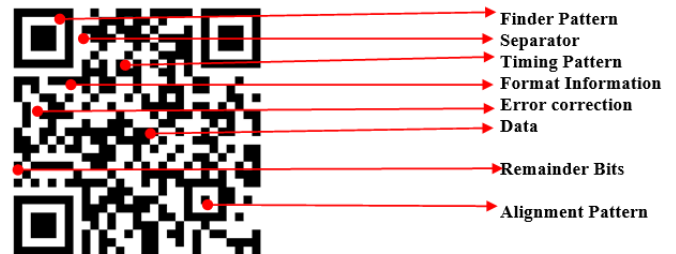

Fig-1: Structure of QR code

(1). **Finder Pattern**: The finder pattern consists of three identical structures that are located in all corners of the QR code except from the bottom right one. Each pattern is based on a 3×3 matrix of black modules surrounded by white modules that are again surrounded by black modules. These patterns facilitate the decoder software to identify the QR code and determine the correct orientation.

(2). **Separators**: The white separators have a width of one pixel and improve the recognizability of the finder patters as they separate them from the actual data.

(3). **Timing Pattern**: Alternating black and white modules in the timing pattern enable the decoder software determine the width of a single module.

(4). **Alignment Patterns**: Alignment Patterns support the decoder software in compensating for moderate image distortions. With growing size of the code, more alignment patterns are added.

(5). **Format Information**: Format Information section consists of 15 bits next to the separators and stores information about the error correction level of the QR code and the chosen masking pattern.

(6). **Data**: Data is converted into a bit stream and then stored in 8 bit parts (called codewords) in the data section.

(7). **Error Correction**: Similar to data codes, error correction codes are stored in 8 bit long codewords in the error correction section.

(8). **Remainder Bits**: Consists of empty bits, if data and error correction bits can not be divided into 8 bit codewords without remainder.

The surface QR code has to be surrounded by **Quiet Zone**, an area shaded as white modules, to increase code recognition by the decoder software. The capacity of a QR

code depends on several factors, such as the version of the code that defines its size, the chosen error correction level and the type of encoded data influence capacity.

2. PROS AND CONS

At present, QR code have already overtaken the popularity of Universal Product Code (UPC)barcode in many areas because of several advantages like increase in data storage and Kanji-Kana character set capacity, reduced size, dirt and damage resistant, high speed reading, small print out size, 360 degree reading and etc. Combined with the diversity and extendibility offered, makes the use of QR code more appealing than that of the classical barcodes, as QR code also ties the physical to digital world.

However, using QR codes is also not free from disadvantages of any new inventions. Mobile camera and internet connections are the prerequisites for using QR codes. Lack of awareness about use of QR codes among consumers and Lack of offline ability to authenticate source/sponsor of code is another problem.

3. QR CODE FUNCTION.

When customer scan QR code, they immediately redirected to one the following function.

- A website URL: where the detail information is available.
- Wi-Fi access point credentials to initiate the connection from your smartphone
- An email or a text-message ready to be sent
- A business card which can be directly stored in your smartphone's contact list.
- Any events that can be automatically added to your smartphone calendar
- Phone numbers recognized by your smartphone for dialing
- Any simple text to display
- Specifications of particular products or personal information's.

4.USE OF QR CODE

QR code can be used for anytime-anything. It will direct its scanner to a destination of the creator's choice, by breaking out of the mundane banal crowd and engaging in a artistic manner. QR codes are helpful for each customers and vender. For example, a vendor saves advertising costs by distributing a QR code to their web site or universal resource locator. A client will scan this QR code and this enables them to store the data for future reference.

The large variety of languages in Republic of India will create problem for vernacular speakers once they move to another state which usually contains a different tongue.

Once QR codes is scanned it offers language choices to the customers so as to avail the service in a language of their comfort.

[1]. TICKETING AND TOURISM

IRCTC, India's train ticket booking portal, has begun adding QR codes to its printable e-tickets. QR codes are widely used for ticketing. Passenger Name Record numbers or booking user-IDs are usually lengthy, thus in-order to make authentication a quick process, a QR code is added to the ticket.

New Town Kolkata Development Authority (NKDA) has taken an initiative to make the city smarter by adding QR code sign boards. The Authority says "This is a first-of-its-kind initiative to help visitors explore the city. Though the specially designed boards will have basic details about the heritage site, visitors can know more about it by scanning the QR code". "We will put this code on display at different locations of New Town, like police stations, the Hidco building, Eco Park, Rabindra Tirtha, etc, and also upload it on the website. We are working on developing New Town as a smart city and this is another step towards that goal".

New Delhi Municipal Council is planning to introduce QR code-based signage on all heritage sites in its jurisdiction.

The **State Tourism Department of Kerala** has already integrated QR codes into helping tourists reach destinations in addition to the history of the place. Codes at various locations will allow tourists and citizens to navigate easily using Google Maps. The **Union Tourism Ministry** plans on using QR codes to deliver information about heritage sites in New Delhi to tourists in a language of their choice, replacing the out-of-date audio guides.

Software Technology Park of India, Bengaluru has developed a service called **Track Me** that based on QR code technology. Passengers can scan a Track Me QR code in a public transport vehicle (cab, bus, auto rickshaw, etc.) to know details of the driver and share it with others, who can also track each ride. The service was developed with the aim to increase safety of passengers in Bangalore, including the 40,000 women working in the IT sector.

The **Airports Authority of India** is also setting up a QR code-based mobile app to address grievances at airports.

[2]. NEWSPAPER ARTICLES AND ADVERTISEMENTS

The **Times of India**, one of India's leading English newspaper, started using QR codes to connect readers from snippets of news in the paper to full-length articles online.

Print media is still found in wide range in India, despite the growth of online and mobile media. Brands continue to invest heavily in newspaper ads. They are also aware of the growth of usage of smartphones. Hence the number of ads with a QR code are increasing considerably to connect readers from the static print ads to dynamic online media. Brands such as State Bank of India, LG, Spykar, KAFF, Lavasa, Cox & Kings, Symphony, Shoppers Stop, The Collective, DHFL, SimplyMarry, Advanced Hair Studio, Intec, Sikka Group, Manyavar and other are using QR codes in their advertisements to engage their readers with their marketing content.

[3]. BANKING AND PAYMENTS

The government of India has stepped one more step in the direction to making India Digital & introduced another useful yet easy payment method named as **Bharat QR code** payment method. which allows the customer to perform the transaction just by scanning a QR code without using Electronic Data Capture machine. With Bharat QR code, the cashless transaction can be made to merchants.   BharatQR code is interoperable. To make it interoperable, payment network companies Visa, MasterCard, RuPay and American Express have come together.

Since demonetization, e-wallet apps such as *Paytm, Freecharge and Mobikwik, State Bank Buddy,Phonepe, Ola Money, HDFC PayZapp, ICICI Pocket,Airtel Money, AXIS LIME* among others have also seen a surge in usage. While these wallet apps also allow QR code-based payments, both parties need to have the app in-order to perform any transcation .

[4]. EDUCATION AND ENTERTAINMENT

The *Maharashtra State Bureau of Textbook Production and curriculum Research (Balbharti)* has announced the launch of new QR code textbooks that have been designed to make it easier for students to obtain digital copies and to lighten the load they need to carry in their schoolbags. The newly released books have QR codes printed on front pages after each chapter that directly links the reader to the website of Balbharti where the textbooks of all classes are available in PDF format. The E-bharati mobile application, feature the whole text book content of each and every subject in an easy to learn version.

It is considered that QR codes in books make textbook interactive by showing an explainer video instead of static images, saving pages by linking QR code to online photo galleries, concealing solutions in QR codes, providing audio translations for language books and so on. Thus, the codes support experiential learning,brings scholarship out of the classroom into physical experience,they by expanding pedagogical value in execises that draw students into creating and contributing content.

Libraries like *National Institute of Technology Karnataka, Indian Institute of science Education and Research, Bhopal* are also experimenting the use of QR code to deliver library service in user friendly and quick way. The library are using the QR code to give their user access to manuals, library map, library orientation, OPAC, audio and video files.

Coming to entertainment field, a large section of the peoples in India are enthusiastic about cinema those who cannot read or write but they know how to click a picture on their smartphone. **BookMyShow**, a popular movie ticket booking app, also adds a QR code to its Passbook tickets. As most Indians seek entertainment through Bollywood, Tollywood, and other cinemas in the country. The QR code system provides a huge marketing opportunity for its distributors to interact with their audience. QR codes can be used on movie posters to show movie trailers, other videos and to allow booking tickets online.

[5]. IDENTIFICATION AND AUTHENTICATION

The **Aadhaar Card** in India is also having a QR code as its latest identification initiative. This will allow businesses to quickly authenticate user's data by scanning the QR code on the card. The QR code on the Aadhaar Card stores the information of the ID holder including Name, Aadhaar No., Fathers Name, DOB, and Address.

Jadavpur University (JU) in India has introduced QR codes on each degree certificate as a security feature to make it difficult to duplicate.

Whatsapp, the most popular messaging app in India, recently launched Whatsapp Web that is accessible only by scanning a QR code.

ModiNomic opines that - Presently QR code is available for *birth certificate, death certificate, marriage certificates, property tax receipt, demand bill, and demand notice.* Gradually all the city governance related services and other municipal due bills, payment receipts, food and industrial, shop licenses will be covered in this service.

[6]. MOBILE AND MOBILE APPS

Brands can redirect customers to App Store pages to get them to download the brand's mobile application using a QR code, such as Samsung, AirAsia, Gaana, Globus, Big Fish are using QR codes in India including HDFC.

Smartphones and apps with inbuilt QR code reader are launched by XIAOMI, LENOVO, MOTOROLA, MICROMAX CANVAS 4 PLUS A315, XPERIA Z1. **Apps** with QR code scanning feature have been designed by WeCHAT, UC BROWSER, OPERA MINI and BING VISION LENS and others.

[7]. PRODUCT PACKAGING AND CYBERMEDIA

Consumer electronics product companies such as **Sennheiser** and **HP** use QR codes on their packaging to allow buyers to verify the authenticity of their products. QR codes are also used on product packaging to redirect users to additional information or promotional offers. Brands such as Del Monte, Godrej, Amul, Dabur, Johnson-&-Johnson, Pepsi, McDonanald's and Tata Tea have adopted this marketing technique to engage consumers.

A special media company, Cyber Media with its magazines such as *PCQuest, DQIndia, Voice & Data* etc., started implementing plenty of QR codes in its print editions since March 2011 edition. These QR codes would point to different places such as videos, web pages, data capture and response form, a test site, advertisements, reader contests, discount for subscriptions, events and key announcements.

5. CONCLUSIONS

In this article we have reviewed the concept of QR code , its structure, its pros and cons, and its applications. However, QR code is still getting updated from time-to-time, further research possibilities will defiantly explore the security of using QR code for companies and their customers, with this confidence India needs both awareness and use of QR code for its speedy development in this competitive era.

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