User Perception towards QR Code for Libraries: A Study

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ABSTRACT

The technology adoption is becoming increasingly challenging for decision makers in an education institutes, in general and B-school, in particular. The article explores the role of end user perceptions in adoption of technology from the perspective of innovation diffusion theory. The study is based on empirical data from a B-School which explains the implementation rigmarole of Quick Response (QR) code and users capability to use/adopt QR code for web-based services. The result indicates that differentiated implementation strategies focused on specific services are likely to be more successful than a single broadbrush strategy for all services and activities.

Keywords: Technology Adoption, Quick Response Code, QR Code, User Perception

Introduction:

Just saw a billboard with new smart phone? Scan the QR code on the billboard and watch a video to learn about its feature (Dobbs, 2011). Looking for 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. Literature reveals that in educational institute libraries use QR codes and some case studies are shared in Library Success: a Best Practices Wiki (www.libsuccess.org). QR technology is most effectively used in situations where you want to add a dynamic component to communication that would otherwise be non-interactive. The case studies and the QR codes in publications and Ads attracted the author to bring QR code in a B-school scenario.
The study takes off from the point of view of the innovation diffusion theory. While the origins of the innovation diffusion theory lies in sociology, it has been over the period of time, used as an analysis tool for the adoption of new technology by the society. The diffusion of the innovation happens through a five-step - Knowledge, Persuasion, Decision, Implementation and Confirmation. To detail:

- In the Knowledge step the individual has a general lack of awareness of innovation.
- In the Persuasion step the individual is aware of the innovation and desires to know more about it.
- In the Decision step is a very personal process where the individual decides whether to adopt the innovation or not
- The Implementation step is where the individual adopts the innovation in varying degrees depending on the circumstances and wish to know more about the innovation
- Finally in the Confirmation step the individual ends up making use of the innovation to its fullest potential.

In this study the authors with the help of the literature and the test-bed developed - to create and understand QR code - are having confidence of passing the first two steps i.e., Knowledge and Persuasion. The learning process carried out during Decision stage is shared in this article. However, this article tests the first three stages – Knowledge, Persuasion and Decision – stages among the sample size considered. In this attempt QR code considered as technology innovation; on which the awareness of the innovation by the users (in this study student community) is studied in a B-school environment.

This study is an exploratory in nature which attempts to find the awareness (Knowledge) and perception (Persuasion) about QR codes among a B-school students’ community. The results is expected to help decision making (Decision) by the authors who are the members of the technology implementation committee. The article explores the role of end user perceptions in the adoption of technology from the perspective of innovation diffusion theory. The study is based on empirical data from a B-School survey on QR code implement-ability for providing quick access to web resources and web links. This study envisages to bring forth the details of why organizations adopt new technologies, per se QR Code, what are the services (and products) offered by the organization that can be brought under the umbrella of QR Code, and what is the implementation rigmarole of QR code.

The published literature, Open Archive Initiative (OAI) articles and the freely available web resources are the key source in gaining knowledge about QR Code. Authors have capsulated the understanding about QR code in the subsequent section.
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.

![QR Code](image)

**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 (http://www.hswsolutions.com, 2000 - 2011). Some of the applications are presented in Figure 2.
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 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 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 and Neo Reader. 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 21 x 21 pixels, (Eby, 2012). The 21 x 21 pixel size is version 1, 25 x 25 is version 2, and so on. The 177 x 177 size is version 40.

**QR code in Institutions**

Adopt, adapt, apply, achieve - is the key process of innovation, which can be found by taking lateral leaps outside the box into an area where existing technologies that work in one industry are creatively applied in another to achieve better results. This is true in case of technological adaptations in educational institutions (Ashford, 2010) also, right from the typewriter to Web 2.0. One of the primary goals of strategic plan is to change the way we serve, reach and fulfil the information needs of the stakeholders of the educational institute - Management, Faculty, Staff and Students. This includes the changing techniques of service delivery, delivering more services off-sites, and expanding technology use, availability and complexity (MacKinnon, 2010).

Today, QR codes can be found on magazines, journals, individual articles in Journal (ex: Emerald Publications), business cards, institute/company brochures, eBooks, product promotional materials (ex: Posters, Gift articles, etc.), Publishers catalogue, etc. The square-shaped code picture in a black matrix pattern against a white background is acting as a point to access the information about the product, complete information, webpage, etc. When the code is scanned by a camera that has been loaded with the appropriate scanning software can redirect a user to a website which can provide additional information or access to complete text or to the host webpage.

The literature study reveals that the use of QR Code is educational institutions is mainly seen in library and information centres (Hurst-Wahl, 2011). The key reason is the demand from the user to provide access to information resources through their mobile is high (Margolis, 2011). Quick Response (QR) code is one such technology which can cater to the user demand of providing access to resources through mobile. The literature opines that QR codes would
reduce dependence on computers (Walsh, 2009) in accessing and offer a varied alternative access points to electronic resources. Some of the key applications of QR code in an educational institute are presented in following Figure 3.

![Figure 3: Key Applications in Educational Institutes](image)

Currently one can see the increase in QR Code’s popularity across the academic libraries of Europe and other developed countries in exploring its potentiality in reaching the e-Resources (Massis, 2011). The libraries are using this as an access tool as an additional marketing technique that may prove successful in introducing resources to tech-savvy users.

Following are some of the case studies (Top ten trends in academic libraries: A review of the current literature., 2010) from different libraries which demonstrate the use of QR codes. The Wiki managed by Meredith Farkas on Library Success: A Best Practices Wiki provides the case studies on QR code in libraries; some of them are included in list below.

- The University of Huddersfield uses QR Code for “Text a Librarian” OR “Ask a Librarian” service. Users scan code and send their queries, requests or message they want to do to the library, this will reach the correct account for processing.

- The Michigan State University, Lawrence University, Brigham Young University, Half Hollow Hills Community Library, Ryerson University Library and other Universities are using the QR code in providing access to the library guides concerned to different sections and services. The scan of these codes by the users’ mobile phone takes them to the sections and will provide the complete information about the section and its services. They are using the same to contact the librarian.
The Miami University Libraries are using QR code to share information regarding - Ask Us, Library Hours, Library Guide, Video Tutorials and other library promotional services. Further, the libraries are using the QR code to provide the access to OPAC and when a user scans the QR Code of a book it will lead him to eBook. Further, it will list other books by the same author, books on the same topic, and even reviews of the work.

The University of Bath provides QR codes on its library OPAC that gives brief details of the entries for each item. These codes will lead the users towards additional resources associated with the title.

Boise State University's Albertsons library has used the QR code to provide access to Blog (http://albertsonlibrary.blogspot.in/) and the Twitter page (https://twitter.com/BSULibrary/). Albertsons library also shares the informative document about the QR codes - creation, use and scanning - and tips to implement in real life situation.

RMIT University Library in an effort to reach-out the larger participants for its surveys has used QR codes. The posters indicating the title of the survey and the QR code which can take them to the survey webpage was made available in the area where large foot prints are seen. This has paid the results in increasing the number of participants in the surveys.

Contra Costa County Library is using QR codes to market the resources accompanied with the conventional resources (Contra Costa County Library, 2011). The codes which provide access to the e-books, downloadable audio-books, and electronic version of the journals subscribed, etc.

Organizations which are using QR code have shared their experiences in Youtube; Flickr, etc. This has helped the authors in understanding the working mode of the QR code and its usage. For example, Lawrence University has shared the way they use QR codes in Flickr; Miami University has hosted on its website, Biblioteca Rector Gabriel Ferraté (BRGF) has shared on Youtube (URL: http://www.youtube.com/watch?v=OQj3kD0F2uI)

The literature available on QR code application in libraries by Bruce Massis (2011), Meredith Farkas (2011), MacKinnon (2010), Ashford (2010) and Walsh (2009) reveals the following ideas which can be implemented for enhancing the user access to electronic resources.

- The conventional resources in library like books, journals, video/audio materials, company reports, etc., can be supported by QR code which can act as a point of reference to online electronic holdings and additional resources.
• The library posters can have QR code which can lead the user to the virtual tour, audio tours for orientations.

• QR code with the library’s text message on reference service and other contact information helps the patron to quickly reach the desired section.

• The art works, the paintings, posters of events with a QR code links to the artists’ or events’ Web sites.

• The QR code placed on library staff directory pages in the library websites can guide the users to contact them.

• The conference room, interaction room and the other places in library which demand the reservation to use can have the QR code on doors, which can take the user to the reservation forms to place the reservation or blocking.

The literature which provides information about the application of QR code in libraries and stated that QR code can act as driving force in accessing information through mobile technology in developing countries. The studies have proved that this technology-mediated tool can bring the traffic to the eResources. Proper positioning of these codes on static surfaces can function as an additional marketing tool for libraries to employ for those tech-savvy users eager to embrace the latest marketing techniques (Massis, 2011).

Methodology

A survey method of gathering primary data from the population was employed. The sample size was 360, and 267 sent the filled-in Questionnaire with their responses. The Survey was proposed since the answers of the respondents were necessary to analyse and conclude the imperatives of employing QR code. A web questionnaire (see Appendix A) using GoogleDocs, was administered to the students. The convenient sampling was employed since it was a pilot study; and also because of the easy accessibility of the student community, it was found that this sampling technique worked out in the favour of the study.

The questionnaire was designed keeping the following key objectives in mind.

1. To study the awareness of QR Code technology
2. To understand the availability of technological tools for use of QR Code
3. To identify the likely services that can be introduced using QR Code

The data collected by online survey indicates substantial variance across users' awareness towards QR code, applications in terms of adoption rates and perceptions towards the QR code. The results of the survey and the opinion of the authors are shared in the subsequent section.
1. Survey Findings

Reproduced here are the results of the questionnaire survey administered on the sample population. It is found that some 30% of the student community were aware (see Figure 4) of QR code but only only a few (5%) of them have actually used QR code for information from the web resources. The total lack of awareness among 70% and 25% who have never used demands a well structured information literacy program about QR code to the student community.

![QR Code familiarity chart]

Figure 4: Awareness of QR Code among Student Community

The pictorial diagram about the awareness about QR code (Figure 4) clearly presents a very poor picture regarding QR code familiarity among students. Even though it is clearly disappointing to know from the survey that familiarity of QR code in the Gen-X was dismal, persuasion was thought of as one of the tactics to create literacy about the QR code and to present the in-house web resources in posters which has QR code to access the same.

![Implementation of QR Code tech in Library chart]

Figure 5: Willingness to use QR Code to Access Information Resources
Figure 5 depicts that, even though the student community is not aware about the technology, it can be inferred that they are very eager to use QR code at least for the sake of curiosity initially and then take it on for other crucial and decisive purposes. The above diagram depicts that around 72% students are ready to accept the QR code implementation in library. From the extensive literature review done, it was found that a majority of QR code implementations were in the Library and its associated services since the library is the hub of information and services it offers. Thus the authors with this intention in mind queried the community users for their opinion on the QR code usage for the referred B-school in the paper for the usage of QR code in the services. Not surprising many community users responded positively for the implementation of the QR code. Around 28% of the students are either not aware about how it will help them (7%) and 21% don’t want any implementation initiatives as they are either not aware about the technology or not used.

![Graph showing smartphone ownership among student community](image)

*Figure 6: Ownership of Smartphone among Student Community*

In the era where the Gen-X / Gen-Y that has a fetish for smart gadgets, it was not a surprise to note that a majority of the students who participated in the survey were the owners of smart phones. Majority of the students possessed (from Figure 6) Nokia (40%) and Samsung (36%) followed by Sony Ericsson (12%) and the rest were negligible when compared. The findings on ownership of smart phones clearly indicate that the availability of technology (88%) for of student community for the use of QR code. Thus, it may be conclude that the student community possess the technology and interest in using the technology, but, the awareness and utility of the QR code is the key focal point that needs to be addressed.
Conclusion

The study was an eye-opener to the authors in more than one way. While the authors started with the premise of the innovation diffusion theory, the study to the authors' surprise brought forth aspects that were either barriers for the QR code implementation—that needed to be tackled—or the aspects were already the 'ideal hotbed' for the technology innovation to be implemented. Needless to say, these aspects will vary with each institution that wants to implement QR code successfully. The following were the key aspects in no particular order/classification that were realised from the study.

✓ Even though we have the technology with the student community and the technology on the open source platform, institutions are not cashing in, on the utility of the same in providing access to information resources.

✓ The well-structured holistic Information literacy program (ILP) about the QR code to the end-users can help the utilization of QR technology to the maximum extent. The ILP should stress on the use of QR code for information use and access using smart phones needs to be stressed.

✓ At this point of time, in this research on technology innovations for student centric services, the authors feel that by use of QR codes in random services offered by the Institution can act as a marketing tool for spreading the awareness of QR code. Also, posters introducing the information resources both subscribed and freely available, with the access point using QR code can act as awareness campaign in the campus.

✓ Even though the literature on QR code introduces the technology, the implementation and evaluative studies are not seen in abundant. The authors opine that the availability of success stories of implementation and the user survey on QR code will help the QR code implementation. This clearly indicates the need of comprehensive research in this area.

✓ From the literature review, the authors conclude that QR codes are adopted more predominantly in the Marketing and Advertising domain by organization to showcase their products or services, targeting their external stakeholders. Internal stakeholders are yet to experience the full potential of QR code for the services available within the organization.

✓ The reviewed case studies, it was concluded that in educational institutions, libraries used QR code hugely to market the services that they offer. Hence, to start with, adoption of QR code technology in the library of the referred B-school was justified.
Implementation

The Library being the information Centre in many ways for an Institute of Higher learning was the first place where the QR code was implemented in this B-School. The broad areas identified in Library were – Journals, Magazines, Subscribed Database links, Key Open Repositories and Intranet knowledge portal. The service areas such as - Admissions related information, Placements related information, Employees business cards and Events hosted by the Institute – were earmarked for QR Code implementation.

To sign off, QR codes have tremendous potential and in the efforts to disseminate information. To engage with a generation of mobile, social and always-connected, students using this technology provides an opportunity to not only facilitate various services in a B-School such as library tasks etc., but also to strength connections with the Gen-X.

Bibliography


