

QR CODE AND THEIR APPLICATION IN ACADEMIC LIBRARIES: A CASE STUDY FROM ST. XAVIER'S UNIVERSITY, KOLKATA

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Abstract: QR codes, or Quick Response codes, have gained popularity in recent years as a means of providing quick and easy access to information. In libraries, QR codes are being used to enhance the user experience and improve the efficiency of library services. Different organisations utilise QR codes in a variety of ways for their own needs, such as advertising and selling items. The library uses it as a medium to connect users with the papers and information they're looking for. The libraries of the twenty-first century are entirely automated and are aware of user needs. They consistently strive to offer their users services of the highest caliber regardless of geographical limitations. In other countries, a lot of libraries have started using QR codes. This paper explains brief basic concept of QR Code, their structure, advantageous nature, and its access methods. Also amend the advantages of using QR Codes in Library and the potential role of QR Codes in the Library to ensure maximum usage of resources especially in Fr. Arrupe Central Library of St Xavier's University, Kolkata.

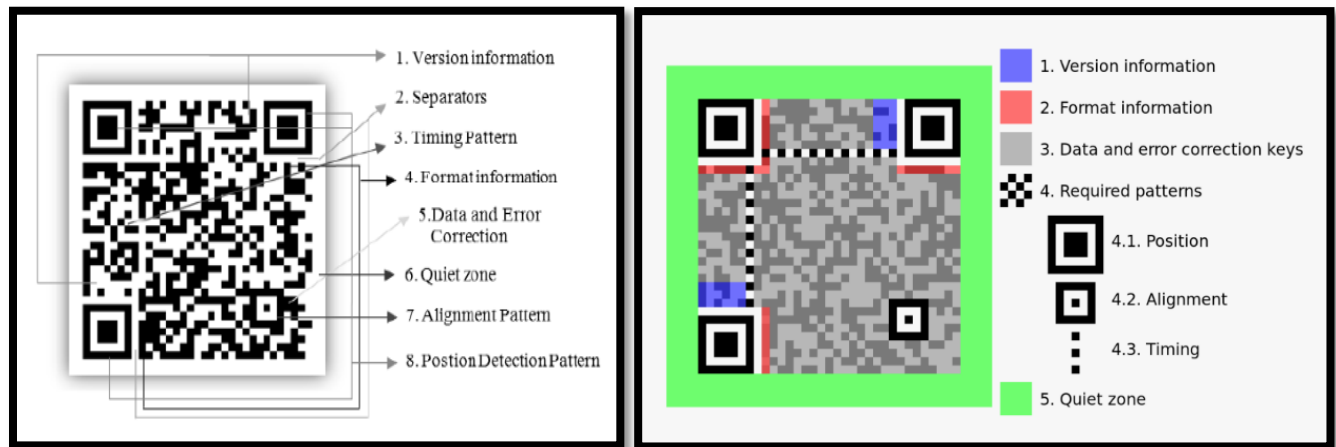
Keyword: QR Code, Academic Library, SXUK, Library service, Technology, Mobile, Scan

1.0 Introduction

A smartphone or QR code reader can read Quick Response (QR) codes, which are a kind of two-dimensional barcode. It was first developed in 1994 by a Japanese company called Denso Wave and has since become extremely popular due to its versatility and ease of usage. QR codes may carry a variety of data kinds, including phone numbers, product specs, website URLs, and more. They can be utilised for ticketing, loyalty programmes, and payments as well. One of the key advantages of QR codes is that they can store a lot more data than traditional barcodes. The QR code can be read by a smartphone's camera just by being pointed at it; no other action is required. The data that is stored in the code can then be accessed or downloaded by the user. Due to its versatility and ability to be printed on a variety of materials, such as flyers, posters, and product packaging, QR codes are frequently used in marketing and advertising efforts. In both business and daily life, QR code technology has a wide range of possible uses. For example, it may be used to enlighten tourists about historical sites, help people find their way through a huge mall, or provide them with nutritional information about foods. Overall, QR code technology is a flexible and practical tool with a wide range of possible uses. Future applications for QR codes are expected to be even more creative as smartphones become more commonplace and technology advances.

2.0 Structure of QR Code

It's worthwhile to look into a few QR code features in more detail. The encoding of massive amounts of data is the key feature of the QR code. Up to 20 digits can be stored in traditional bar codes. However, compared to bar codes, QR codes can offer up to a hundred times more information. All forms of data, including words, figures, images, and audio or video files, can be managed using QR codes. Up to a little over 7,000 characters can be encoded in a single QR code. The capacity of a QR code that can encode 300 alphanumeric characters, for instance, is shown in the image below.



- 2.1 **Separators:** which distinguish the cell position pattern from the rest of the data?
- 2.2 **Timing patterns:** These are sandwiched between two positioned patterns in a manner that slows down incoming code timing. This design is essentially employed as the centre correspondent of each cell that has a black and white pattern, respectively.
- 2.3 **Alignment pattern:** When scanning a QR Code with a camera, the align pattern is utilised to correct any deceit introduced by photo-taking. The main component of the correspondence is used to identify and correct symbol distortion.
- 2.4 **The data zone:** The data zone of the QR Code is the area where encoded data is stored,
- 2.5 **The Quiet zone:** There is a minimum 4-bit space surrounding the code. There is no restriction on symbolism in this area. Keep the QR code symbol for the outside region separate as well.
- 2.5 **Version Information:** While the code is distorted, the variations of the QR Code reformat data to aid in error rectification and data restoration. It is situated close to a different location, and the scanners quickly read it after decoding.

3.0 QR Code based Popular Projects

QR code technology has become increasingly popular in recent years, and there are numerous projects that are based on it. Here are a few examples:

- 3.1 **Mobile payments:** QR codes are commonly used in mobile payment systems. Services like AliPay, WeChat Pay, and Paytm allow users to pay for goods and services by scanning a QR code using their smartphone.
- 3.2 **Ticketing:** For event ticketing, such as for concerts, sporting events, and movie theatres, QR codes are frequently employed. At the entrance to the event, the QR code on the ticket is scanned to confirm its validity and grant entry to the ticket bearer.
- 3.3 **Loyalty programs:** Customers can scan a QR code to participate in loyalty programmes and earn points or incentives for their purchases. Customer loyalty and repeat business may result from this.
- 3.4 **Marketing campaigns:** Customers may instantly get more information about a product or service by using QR codes in marketing efforts. For instance, the user can download an app or access a website with extra information by scanning a QR code on a poster or billboard.
- 3.5 **Inventory management:** Systems for inventory management can employ QR codes to track products as they move through a supply chain. At every step of the process, a distinct QR code for each product may be scanned to enable real-time tracking and inventory control.
- 3.6 **Authentication and security:** To confirm a user's identity, QR codes can be employed as a security measure. For instance, a QR code might be used to grant entry to a secure building or to confirm a product's validity.

These are only a few of the numerous projects that utilise QR code technology. We may anticipate even more cutting-edge uses for QR codes in a variety of industries as their adoption expands.

4.0 Use of QR code in academic library system

Quick Response (QR) codes are two-dimensional barcodes that can store data in a way that is machine-readable. In recent years, libraries have used QR codes more frequently to give patrons instant access to information and resources.

- 4.1 **Linking to library resources:** To give patrons immediate access to materials like electronic books, databases, and online journals, libraries can use QR codes. Instead of manually entering a URL or searching for the site, users simply scan the code with their smartphone or tablet to be taken directly to it.
- 4.2 **Providing additional information:** A User can use QR codes to access more details on a book or other piece of library equipment. For instance, a QR code may be printed on a bookshelf, and scanning the code would display a list of books that are connected to it or author information.
- 4.3 **Promoting library events:** Libraries can advertise events like author readings and book clubs using QR codes. Users may be sent to a registration page or given further details about the event by scanning the code.
- 4.4 **Streamlining library services:** Library services like checkouts and renewals can be made more efficient with the help of QR codes. Without needing to stand in queue at the circulation desk, users could check out a book or renew an item by scanning a code.

Overall, employing QR codes in libraries could make it easier for patrons to obtain information and resources and could also help libraries promote their offerings to a wider audience.

5.0 Advantages of QR Code in academic libraries

The use of QR technology in libraries offers several advantages, including: Quick and easy access to information: Users of libraries can quickly and easily obtain information about the collections, services, and events by using QR codes. Users can access details about books, articles, or other materials, as well as learn about forthcoming events or services, by simply scanning a QR code. Enhancing user experience: By offering consumers interactive and interesting experiences, QR codes can improve the user experience in libraries. For instance, QR codes can be used to enhance standard print publications with multimedia content, such as films or audio recordings. Promoting library services and resources: Users can be creatively and effectively introduced to library resources and services by using QR codes. For instance, QR codes can be placed on library flyers or posters to give users more details or point them to a particular website or service. Improving efficiency: The usage of QR codes can improve efficiency and streamline library operations. For instance, QR codes can be used to automate the process of checking out and returning library materials, eliminating the need for manual barcode scanning. Cost-effective: Since QR codes are simple to develop and print on a number of surfaces, including flyers, posters, and book covers, they are inexpensive to implement. In conclusion, employing QR technology in libraries has a number of benefits that can improve user experience, advertise library services and resources, and increase effectiveness.

6.0 QR Code Technology Access Methods

User need a smartphone or tablet with a camera and a QR code reader app installed in order to access a QR code. The steps to scan a QR code are as follows: Launch the QR code reader app on your tablet or smartphone. You can get a QR code reader app from the app store on your device if you do not already have one. Focus the camera on your device on the QR code. Make sure the camera can capture the QR code. The QR code will be immediately recognised by the QR code reader app, which will then decipher the data it holds. The screen of your device will show the data that is encoded in the QR code. This could be a reference to a website, a contact number, or other details. To access the data or carry out the action it is linked to, simply follow the QR code's instructions. It's critical to keep in mind that some QR codes could lead to risky websites or include harmful software. Always use caution when scanning QR codes from unknown sources, and make sure your device's security software is up to date.

7.0 QR code application in libraries – Earlier Studies

A full description of QR codes and their application in libraries is given by Dani and Patil (2020). The advantages of employing QR codes are covered by the writers, including facilitating quick access to library resources and improving user experience. The article also discusses some of the difficulties in using QR codes in libraries, such as the demand for smartphone use and the risk of malicious use of QR codes. Gopale (2019) investigates how two

university libraries are using QR codes to promote their services and resources. The authors discovered that QR codes might effectively advertise library resources and services, especially to mobile users. The survey did discover, however, that many consumers needed some instruction on how to utilise QR codes because they were unfamiliar with them. Bellary (2018) looks at how QR codes are used in library services and outlines some of the main advantages and difficulties. The author emphasises how QR codes could facilitate rapid and simple access to library resources and boost the effectiveness of library services. QR codes can be limited in some circumstances due to the need for smartphones and internet connections, as the author points out. A community college library could use QR codes to enhance its offerings and holdings, according to Shettar (2016). The author discovered that using QR codes to enable quick and simple access to library resources like databases and eBooks was an effective strategy. The article also notes some of the difficulties associated with QR codes. These difficulties include the requirement for smartphones and the potential for malicious QR code usage. The body of research indicates that QR codes may increase customer satisfaction and boost the effectiveness of library services. However, the use of QR codes necessitates careful planning and attention to library patrons' demands. To determine the long-term effect of QR codes on library services and resources, more investigation is required.

8.0 St. Xavier's University, Kolkata and Its vision

St. Xavier's University, Kolkata, sometimes known as SXUK, is a private university in Kolkata, West Bengal, India. It is situated in the Rajarhat neighbourhood. The institution was founded in 2017 and is associated with the 150+ year-old Jesuit-run St. Xavier's College in Kolkata. Business management, commerce, economics, English, law, mass communication, and social work are just a few of the subjects that SXUK offers as undergraduate, graduate, and doctorate programmes. The academic programmes of the university are created to give students a comprehensive and multidisciplinary education that emphasises ethical principles, creativity, and critical thinking. The high emphasis on research and innovation at SXUK is one of its distinguishing characteristics. Modern research facilities are available at the university, and both staff and students are encouraged to conduct research that advances knowledge and tackles real-world issues. To encourage collaboration and idea sharing, SXUK has also formed relationships with top universities and research organisations in India and overseas.

In addition to academics, SXUK provides its students with a range of extracurricular activities and sporting opportunities. The university boasts a thriving student body, and there are various organisations and organisations operated by students that provide events and activities all year round. The university also offers students the chance to be active and develop their sporting interests with its well-equipped gym, sports complex, and swimming pool. Overall, St. Xavier's University, Kolkata, continues the Jesuit heritage of excellence in education and service to society as a modern and vibrant institution. Students who want a comprehensive education that will prepare them for leadership roles in the global community favour the university because of its dedication to academic quality, research, and holistic development.



At St. Xavier's University, Kolkata (SXUK), the Fr. Arrupe Central Library is a cutting-edge institution that acts as the centre of all academic and intellectual pursuits on campus. The library, which bears Father Pedro Arrupe's name, is a key component of the university's goal to foster knowledge creation, diffusion, and innovation. Father Pedro Arrupe was a well-known Jesuit priest and educator. The Fr. Arrupe Central Library, which occupies 20,000 square feet, includes a sizable collection of books, journals, magazines, and other academic materials covering a wide range of subject areas. Through the library's web portal, students and faculty members can access the collection of over 27,000 books and more than 300,000 e-books, both on-campus and remotely. Over 300 students may fit in the library's spacious reading room, which is equipped with modern amenities including air conditioning, Wi-Fi, and computer workstations. Accessible to students with visual impairments is a section of the library that provides aids including text-to-speech software and magnifying glasses.

The Fr. Arrupe Central Library at SXUK is a state-of-the-art, luxurious building that aids the university in developing academic achievement and intellectual vitality. The library's enormous resource collection, cutting-edge facilities, and expert library and information science services are essential to the institution's academic and research ecology. For the benefit of professors and students at the SXUK university, the Fr. Arrupe Central Library also offers a wide range of services to aid in their academic and research endeavours. Along with reference and information services, this location also provides printing, photocopying, and research support services. To support students and faculty members in developing their academic and research skills, the library routinely hosts seminars, conferences, and training sessions on information literacy and research methodology.



Libraries are regarded as a treasure trove of knowledge due to their extensive and high-quality information resources that are offered without charge to the academic user community. In order to connect the user community with information resources considering the growing use of mobile technology, libraries must use mobile-based QR code technology. The academic community has been significantly impacted by this technology. In conclusion, libraries have recently stepped up their use of QR codes to improve user convenience and offer quick access to information. Despite some disadvantages, such as the requirement that users have a smartphone and an internet connection, the literature suggests that QR codes can be an effective way to promote library services and resources, increase the efficiency of library operations, and provide quick and easy access to library materials. Libraries and librarians should also teach people about QR codes if they are unfamiliar with them. The long-term effects of QR codes on library services and resources, as well as other cutting-edge technologies that could enhance library user experience, need to be assessed in future research.

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