

Awareness and Adoption of Quick Response Code by Librarians in Universities in Delta and Edo States, Nigeria

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Abstract

Rationale of Study – Quick response code is a barcode that stores readable information using a digital device. They track information about products frequently used in marketing and advertising campaigns. The study investigated librarians' awareness and adoption of quick response codes in universities in Delta and Edo states, Nigeria.

Methodology – A descriptive survey design was employed to establish the relationship between librarians' awareness and the willingness to adopt QR codes using a population of 124 librarians from 14 libraries in Delta and Edo states, Nigeria. Frequencies were used to analyse the respondents' demographic information, and the statistical mean (\bar{x}) was used to answer the research questions. The criterion mean was placed at 2.50.

Findings – Findings revealed that many librarians in Delta and Edo States university libraries are familiar with QR codes. Librarians are willing to use QR codes to market services to users, connect users directly to online resources, and create codes for all primary library services to users. There is a significant relationship between librarians' awareness and their willingness to adopt QR codes in university libraries in Delta and Edo states.

Implications – The study recommended that more awareness campaigns be organized to attract more librarians to QR codes.

Originality – This is original research conducted to ascertain the level of awareness and adoption of quick response codes by librarians in university libraries in Delta and Edo states, Nigeria.

Keywords

Awareness, Adoption, QR Code, Librarians, University Libraries, Delta State, Edo State, Nigeria

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1 Introduction

Information Communication Technology has made access to various information resources seamless and swift for information seekers. To meet the information needs of their patrons, libraries in the twenty-first century use ICTs in various ways, such as electronic information resources, academic databases, academic software, educational games, geographical/navigation tools, and social media. One of these solutions, the Quick Response Code (QR Code), also known as a rapid response code, has grown in popularity due to its methods for facilitating quick access to information while saving customers' time in this digital age. Rapid response codes are currently used in libraries for marking services and resources. Parabhoi et al. (2017) outlined some gains of two-dimensional barcodes to libraries, including free access, free software design, speedy accessibility of the information contained in code, easy readability, and code versatility.

The researchers' observations showed that the libraries in Nigeria are yet to adopt QR codes in the libraries. This could be attributed to their level of awareness. Awareness of QR Codes' advantages can help librarians and people alike adopt and use them for promotion (Kenton, 2018). Therefore, this study aims to ascertain the level of QR code awareness and usage among university librarians in the Nigerian states of Delta and Edo.

This study provided answers to the following research questions: To what extent are librarians aware of QR codes in universities in Delta and Edo State, Nigeria? To what extent are librarians ready/willing to adopt QR Codes? There is no significant relationship between librarians' awareness and their adoption of QR codes.

2 Theoretical Framework

The theoretical framework for this study is anchored on the Technology Acceptance Model (TAM) by Davis in 1986, who designed the model for his doctorate proposal. TAM is tailored explicitly for modelling users' acceptance of information systems or technologies. In 1989, Davis used TAM to explain computer usage behaviour. Davis' (1989) TAM aims to explain the general determinants of computer acceptance that lead to explaining users' behaviour across a broad range of end-user computing technologies and user populations. The basic TAM model included and tested two specific beliefs: Perceived Usefulness (PU) and Perceived Ease of Use (PEU). Perceived Usefulness: Davis (1989) defined perceived usefulness as the potential user's subjective likelihood that using a particular system (e.g., Quick Response Code) will improve his/her action.

Perceived Ease of Use: Davis (1989) defined perceived ease of use as the degree to which the potential user expects the information system to be effortless in terms of usage. The final version of the Technology Acceptance Model was formed by Davis and Venkatesh (1996) after the main finding of both perceived usefulness and perceived ease of use were found to have a direct influence on behaviour intention, thus eliminating the need for the attitude construct. Technology Acceptance Model has been elicited in various disciplines. Chen, Rong, Ma, Qu, and Xiong (2017) tested the Technology Acceptance Model for Mobile Social Gaming Service Popularity Analysis. The study found that perceived enjoyment and ease of use are the chief determinants of user attitudes to playing mobile social games. Of these two factors, perceived enjoyment shows a much stronger effect than perceived ease of use, implying that the markets will pay much attention to entertainment-oriented technologies. Dumpit and Fernandez (2017) analysed the use of social media in Higher Education Institutions (HEIs) using the Technology Acceptance Model. Findings show that perceived self-expression, productivity (PU1), and overall usefulness (PU2) are significant determinants of usage behaviour.

Therefore, the factors theorized strongly influence user behaviour and their decision whether or not to accept or reject new technology (QR Code). Suppose librarians are aware that adopting QR codes will be perceived as helpful in improving their services. In that case, they will be eager to adopt it and enhance their knowledge of using the technology. In the same vein, if librarians are aware that using QR codes in their university libraries will be effortless, they will have a positive attitude towards its adoption and use for enhancing their services and resources. Both perceived usefulness and ease of use significantly influence the attitude of librarians toward adopting and increasing their knowledge of the use of QR codes in their university libraries.

3 Literature Review

The quick response has been defined differently by scholars in the literature. Si et al. (2020) defined it as a 2D bar code that one can use to easily reach information through a smartphone in a process known as mobile tagging. Also, Kenton (2018) defined QR Code as a kind of barcode that stores readable information using a digital device. They track information about products frequently used in marketing and advertising campaigns. Identified as Quick Response code, Parabhoi et al. (2017) described it as a two-dimensional barcode that can be easily interpreted by a QR code reader software first introduced in 1994 by the Denson Wave-Toyota Motors subsidiary. Kumar et al.

(2014) noted that QR Codes are two-dimensional images that open up information stored on a webpage or display an image, a video, or text when the camera scans them on any smart device. QR codes are helpful in many ways, including tracking and tracing production batches and retrieving product information. QR codes can be used for all industries, but they are handy for businesses, like manufacturers, that want to track their products through the supply chain (<https://www.itflows.co/post/how-to-use-qr-codes-in-manufacturing>). They contain more information than traditional barcodes and primarily handle four modes of data: alphanumeric, numeric, binary, and Kanji (Kenton, 2018).

Pathak et al. (2018) posit that when awareness increases, the codes become an interesting technology among the library user community and helpful in achieving library goals. Elmore and Stephens (2012) conducted a study that revealed that while awareness regarding the use of specific codes was on the rise in the UK, the efficacy of these codes varied across different libraries. Furthermore, the study found that the codes were less effective than initially anticipated. A similar study by Pons et al. (2011) examined using codes at the Libraries of Universitat Politècnica de València (UPV) in Spain. According to the authors, the level of awareness was found to be inadequate. Consequently, guidelines were developed to enhance the awareness and knowledge of librarians. Library patrons are exposed to promotional materials featuring QR codes prominently displayed on screens and giant posters in high-traffic library areas. This strategic placement is intended to capture the attention of library users. Furthermore, Ahmad and Margam (2016) focused on examining user expectations about the expeditious retrieval of information at the University of Delhi using QR Codes. In this study, 46.66% of the respondents wanted to use the QR code to connect to various media such as songs, videos, websites, surveys, and other related content. Additionally, 26.67% of the participants indicated they would prefer to use the QR code to obtain their library account details through a simple scanning process. Ozkaya et al. (2015) studied factors affecting students' utilization of the code among college students who were recruited from undergraduate classes in business and offered extra credit in alignment with the ethics guidance committee's approval from the university in the western United States and found revealed a low awareness and adoption rate. The findings also revealed a negative correlation between early adopters and QR code use.

Chanda (2019) noted that modern libraries use two-dimensional barcode technology to promote their services and resources. Bottomley (2011) evaluated the QR code

knowledge of library personnel at Leeds Metropolitan University. The purpose of the study was to determine whether the library received any additional benefits from the implementation of codes. Seventy-five percent of the participants reported knowledge of QR codes and ownership of mobile devices capable of scanning these codes, which could result in additional benefits. Some authors have investigated the issue of QR codes in Africa and Nigeria in recent years. In Africa and Kenya, to be specific, respondents familiar with QR codes were aware that academic libraries in Kenya employ the technology in various methods. The respondents explained that they generate QR codes using readily accessible online tools, which they place on printed books, posters, brochures, doors, shelves, and other devices. When asked to explain the factors that have so far influenced the use of QR codes in academic libraries in Kenya, the majority of respondents cited portability (17), the ability to be read on a variety of devices (16), the simplicity of the technology (14), and the low requirement for advanced ICT skills (14) as the primary factors. In addition, factors hindering their popularity emerged. Low ICT skills, user apathy, and resistance to change are examples. These factors necessitate ongoing library education efforts for librarians and patrons.

For instance, Durak et al. (2016) studied it in education and communication in Nigeria. Their study aimed at identifying the participants' views about the QR Code-supported lesson unit. Most participants knew the codes, which were seen as an innovation. Adebayo (2019) posited that two-dimensional code may not yet have captured the interest and attention of most Nigerians due to low awareness of the technology. Ogbomo and Omorodion (2019) studied librarians' awareness and willingness to deploy QR codes in selected university libraries in Nigeria. It was observed that the level of librarians' awareness was low. Results revealed that 62% are ready for its cost-effectiveness, 58% are willing to deploy QR codes because they are not challenging to employ, and 54% will deploy them because so much information can be stored in a code. Furthermore, 50% of respondents were willing to adopt the codes to market library services. Adebayo (2017) identified three basic requirements before using QR codes. These are the availability of a mobile phone, a code application, and Internet connectivity. Kumar (2015) investigated how codes are used in research and instruction in library and information science. The results presented showed that students were hardly aware of the concept. The students were taught about the advantages during lectures to overcome this challenge. Social media like Facebook, Snapchat, Twitter, LinkedIn, and Instagram have all created QR codes that allow users to follow accounts

by scanning the code. Hoy's (2011) study claims that due to the growing uptake of smartphones, librarians can accept QR codes to streamline services and aid library patrons in swiftly and independently locating materials. However, it has been documented that librarians' willingness to adopt new technology depends on several factors, including its benefits, ease of use, and affordability.

Ratajeski and Kraft (2014) observed that the librarians were willing to adopt QR Codes because the codes led users to e-book titles and ensured easy book access. Abbas (2016) examined ICTs appropriation by library staff of the college library Government College of Instruction, Zaria. Abbas found that the respondents were willing to convey ICT. The respondents also mentioned using ICTs for wide-area network applications, with 70 (92.1%) using local area network applications. However, it was discovered that the respondents did not use ICTs for online databases, online information services, library databases, or online access catalogs (each with 0% answer). Barker et al. (2012) considered inserting the codes in library data materials for library administrations, that QR Code was embraced to interface clients straightforwardly to versatile assets, such as apps, move supporters into a chat session with the wandering innovation bolster group, interface benefactors to mobile-optimized enlightening for a circulating projector, give contact data for clients and interface benefactors to more data approximately the different pieces of craftsmanship that the library has. According to Rahaman (2016), the librarians were ready to use rapid code to promote their services and resources at the National Institute of Technology. Modibbo and Echedom (2020) explained that the QR code was initially restricted for use in Japan but its use increased as its symbol was seen in magazines and other media outlets. According to Ateka and Kwanya (2019), the codes were employed to enhance library services in Kenyan libraries.

Furthermore, Ateka and Kwanya noted that the librarians were ready/willing to use QR Codes because they do not require much expertise to use and they are portable. Blummer et al. (2017) stated that to optimize library services, academic libraries' mobile initiatives use QR to enhance students' awareness of library resources, fostering patrons' access to print collections and eBooks. Rahman and Islam (2019) concluded from their study that RFID is massively adopted in libraries to reduce staff stress, increase efficiency, track and locate items quickly, provide book drop support at any time, have easier circulation, and promote self-check-in check-out activities, among others in universities. In Pakistan, Qutab et al. (2014) compared the use of ICTs by public and private university libraries. The use of ICT for membership registration in public and private university libraries was

observed (mean = private: 3.67, public: 3.85); book reservations (mean = private: 3.87, public: 4.55); overdue fines (mean = private: 3.60, public: 4.60); and reminders (mean = private: 3.00, public: 4.60). Use for online chat (mean = private: 3.73, public: 3.95) and interlibrary lending procedures (mean = private: 1.13, public: 1.76) was minimal.

4 Methodology

This study adopted the descriptive survey design of the correlational type with a population of 124 librarians from 14 universities in Edo and Delta States, Nigeria. The study used the total enumeration sampling technique because the population was small, and the researchers had adequate time and funds to carry out the study; thus, all 124 librarians were used as respondents. A questionnaire was used to gather data. The researcher designed the instrument, which consists of different sections. The instrument was titled Questionnaire on Quick Response Code Awareness and Use among Librarians (QQRCAUL). The researchers and one trained research assistant administered the questionnaire to respondents at various universities, and the exercise lasted for two months. It was administered to them and collected on the spot to ensure a high response rate. One hundred twenty-four questionnaires were distributed, and 101 (81%) copies were returned, which is considered adequate. The data collected were analysed using descriptive statistics (Frequency, Mean, and Standard Deviation) to answer the research questions, and the hypothesis was tested using Pearson's product-moment correlation coefficient.

4 Findings of the Study

Table 1 shows the educational qualification and gender distribution of the librarians. 45(44.6%) librarians hold MLS/M.Sc/B.Ed degree, 41(40.6%) holds a B.Sc/BLIS/B.13(12.9) hold a Ph.D. degree, and 2(2%) hold a Diploma certificate. This implies that most respondents in the universities in Delta and Edo states hold a second degree in library science. The Table also presents the gender distribution of respondents. 58(57.4%) are males, while there are 43(42.6%) females. Indicating that male librarians are more than their female colleagues in the universities in Delta and Edo states.

Table 1: Bio-data of Respondents

Educational Qualification	Frequency	Percentage (%)
Diploma	2	2.0
B.Sc/BLIS/B.Ed	41	40.6

Educational Qualification	Frequency	Percentage (%)
Diploma	2	2.0
B.Sc/BLIS/B.Ed	41	40.6
MLS/M.Sc/M.Ed	45	44.6
Ph.D	13	12.9
Total	101	100.0

Gender	Frequency	Percentage (%)
Male	58	57.4
Female	43	42.6
Total	101	100.0

1: To what extent are librarians aware of QR codes in universities in Delta and Edo State, Nigeria?

Presented in Table 2, some data explains the extent to which librarians are aware of QR codes. It shows an aggregate mean of 1.97, more significant than the criterion mean of 1.50. This implies that librarians are highly aware of the code in universities in Delta and Edo States, Nigeria.

Table 2: Librarians' Awareness of QR Code

I am aware of QR Code in the following ways:	Aware	Unaware	Mean
Two-dimensional bar code	101	0	2.00
Be read by QR code reader software	101	0	2.00
A smartphone that is internet enabled is a requirement to read QR Code	100	1	1.99
A link to library resources	101	0	2.00
Used for reference services	100	1	1.99
Used for directional services	98	3	1.97
Used for library promotional services	101	0	2.00
Used to foster swift access to information	100	1	1.99
Used for the creation of banners for the workshops, training, seminar, conference, and induction programs	100	1	1.99
Used to Integrate all the library social media presence	99	2	1.98
Used to eliminate the chances of making mistakes when	96	5	1.95

putting contact information manually.			
vCard is used to store bibliographic information of Authors	101	0	2.00
Used to foster accessible location on the map	98	3	1.97
Calendar event OR code is used for Concert	100	1	1.99
Used for social media activities like linking a page	100	1	1.99
To make a call when scanned	98	3	1.97
Aggregate Mean=			1.97
Criterion Mean =			1.50

2: To what extent are librarians willing to embrace QR Codes?

Table 3 shows how much librarians are willing to embrace QR codes in their universities. With an aggregate mean of 3.11, the results show that librarians are highly willing to adopt QR codes in university libraries. Librarians indicated a willingness to use them to market services to users, connect users directly to mobile resources, and create codes for all significant library services to users.

Table 3: Extent of Librarians' Willingness to Embrace QR Code

Willingness to use QR for the following:	HW	W	NW	NHW	Mean
Paste them in different sections of the library	18	80	1	2	3.13
To market Library services to users	22	76	1	2	3.17
To create directions in the library	17	81	1	2	3.12
To connect users directly to mobile resources	21	77	1	2	3.16
Share current information with users	18	81	1	1	3.15
Do selective dissemination of information	20	77	2	2	3.14
To create QR codes for all significant library services for users	26	67	6	2	3.16
Use QR Code since the majority of library users have smartphones	18	76	5	2	3.09
To create banners for the workshops, training, seminar, conference, and induction programs for users.	17	61	21	2	2.92
Aggregate Mean=					3.11
Criterion Mean =					2.50

3: There is no significant relationship between librarians' awareness and the adoption of QR codes.

To test this hypothesis, the Pearson correlation was used. From Table 4, the Pearson correlation coefficient r ($=0.291$). Since the significant value (Sig.2-tailed) is 0.003 (less than 0.05), a positively significant relationship exists between awareness and the willingness to adopt QR codes in universities. The null hypothesis is therefore rejected, implying that an increase in librarians' awareness of QR codes may result in a corresponding rise in adoption in the universities in Delta and Edo states, Nigeria.

Table 4: Relationship between Librarians' Awareness and the Willingness to Adopt QR Code

		Awareness of QR Code	Willingness to Adopt QR Code
Awareness of QR Code	Pearson Correlation	1	.291
	Sig. (2-tailed)		.003
	N	101	101
Willingness to Adopt QR Code	Pearson Correlation	.291	1
	Sig. (2-tailed)	.003	
	N	101	101

5 Discussion of the Findings

College librarians in Nigerian institutions located in Delta and Edo completely understand the QR code. The evidence presented in this article is consistent with the claim made by Ashford (2010) regarding the extensive application of QR Codes in Japan. The remark mentioned above is consistent with the research carried out by Durak, Ozkeskin, and Ataizi (2016). This research established that a sizeable proportion of the respondents demonstrated knowledge of QR Codes, although QR Codes were seen as a recent development in technical innovation.

According to the study's findings, university librarians have a favourable attitude toward introducing QR codes into their own institutions' libraries. They have shown a notable propensity to utilize them in promoting their services to users, facilitating direct access to mobile resources, and devising protocols for all critical library services. Librarians have shown a marked tendency to employ them in promoting their services to users. This finding aligns with the hypotheses proposed by Ogbomo and Omorodion (2019) and Ateka and Kwanya (2019), which suggest that some librarians are leaning toward adopting QR Codes due to their compactness, compatibility with a variety of

technologies, user-friendliness, and minimal ICT knowledge requirements. This finding is consistent with the hypotheses Ogbomo and Omorodion (2019) and Ateka and Kwanya (2019) proposed. The research that led to the above discovery was carried out by Ogbomo and Omorodion (2019) and Ateka and Kwanya (2019).

The research findings demonstrate a significant correlation (relationship) between the level of awareness and the degree of preparedness among university librarians to adopt QR code technology, as supported by statistical evidence. The proposition mentioned above posits that a rise in the comprehension of QR codes among librarians in the academic institutions in Delta and Edo states could potentially result in a commensurate surge in implementing the aforementioned technological innovation in those regions. The present discovery is consistent with the hypothesis posited by Pathak (2017) that increased awareness of QR Code technology among library users can enhance its appeal and usefulness in achieving library objectives. The present discovery provides evidence in support of Pathak's hypothesis. Sinkinson and Stoeckel (2011) hypothesised that the prevalence of QR codes in university and college libraries is rising due to increased technology awareness. This is a positive move since more advanced technologies are expected in the information spaces in the near future (Kibe et al., 2023; Kwanya, 2023).

6 Conclusion

Librarians employed at universities in Delta and Edo states exhibit an extraordinary level of familiarity with QR Codes and express a keen interest in integrating them into the operations and provisions of their respective libraries. There is a significant correlation between the level of awareness among librarians and their propensity to adopt QR code technology in colleges in Delta and Edo States, Nigeria.

7 Recommendations

The following recommendations are made:

1. Using QR Codes in libraries requires further attention from librarians. Therefore, it is recommended that libraries implement awareness strategies to achieve this goal.
2. Given the favourable disposition of librarians towards QR Codes and their readiness to incorporate them, it is recommended that library administrations promote the utilization of QR Codes among students.

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