

# Enhanced Business Marketing for Small Scale Enterprises Via the Quick Response Code Technology

Onyechere Patricia Onyinyechi<sup>1</sup>, Otuonye Anthony Ifeanyi<sup>2,\*</sup>, Ekedebe Nnanna Nnabuchi<sup>2</sup>, Ibe Perpetual Nwakaego<sup>3</sup>

<sup>1</sup>Department of Management Technology, Federal University of Technology Owerri, Owerri, Imo State, Nigeria

<sup>2</sup>Department of Information Technology, Federal University of Technology Owerri, Owerri, Imo State, Nigeria

<sup>3</sup>Department of Computer Science Technology, Imo State Polytechnic, Umuagwo, Owerri, Nigeria

## Email address:

ifeanyiotuonye@yahoo.com (O. A. Ifeanyi)

\*Corresponding author

## To cite this article:

Onyechere Patricia Onyinyechi, Otuonye Anthony Ifeanyi, Ekedebe Nnanna Nnabuchi, Ibe Perpetual Nwakaego. Enhanced Business Marketing for Small Scale Enterprises Via the Quick Response Code Technology. *Frontiers*. Vol. 1, No. 1, 2021, pp. 7-13.

doi: 10.11648/j.frontiers.20210101.12

Received: January 28, 2021; Accepted: February 20, 2021; Published: March 12, 2021

**Abstract:** In business marketing, there has been a growing need to bridge the gap between digital destination or online content, and the paper-based communication media. In other words, there is need for instant accessibility of both online and offline media contents via a single platform in order to reach a vast majority of potential customers. A deployment of the Quick Response Code Technology into the business marketing plan will bridge this gap. Quick Response code Technology is perceived to be cutting edge though it has been around since 1994, but most business owners and entrepreneurs are unaware of its capability to improve their marketing drive, especially now that majority of potential customers make use of mobile devices. Using the Quick Response (QR) code technology, it is possible to digitally connect consumers of your paper-based content to your online content in a matter of seconds. By reading and decoding the encrypted QR code using a smartphone, customers can gain access to business information that may not contain on a small business card. This is the missing link for the much desired breakthrough in business marketing for Small and Medium Scale Enterprises around the globe. The technology can be used to track information about products in a supply chain and to promote marketing and advertisement campaigns. By connecting consumers of your paper-based content to the internet, a smartphone user can have access to product information, and to company's website or social media pages. In this paper, we have exposed the potential benefits of the Quick Response code technology on Business Marketing, especially for Small and Medium Scale Enterprises (SMEs), who can only afford little budget for affiliate marketing agencies and other promotional marketing strategies. Again, using the Roger's Innovation Decision Process Theory, and the CIPP Evaluation Model, we proposed a suitable model of the Quick Response Code Technology to enhance marketing drive for small scale enterprises. This technology will increasingly play an enabling role in future mobile strategy for product sales, information access and promotional programs.

**Keywords:** QR Code, Smartphone, Business Marketing, Digital Information, Media Content

## 1. Introduction

### 1.1. Background Information

The business world today is in need of technologies that can enhance product marketing strategy and improve information access and business promotion. Business marketing has become one of the greatest catalysts to profit maximization. To show the importance of marketing and business promotion,

large businesses have even gone as far as contracting some marketing companies as affiliates to carry out the business of product promotion on their behalf [13]. Small and Medium scale Enterprises (SMEs) have always sought for ways of promoting the buying and selling of their products or services. Most SMEs seek low cost means of locating their ideal customers in order to share important message and useful information regarding their products and services.

Close observation reveals that many potential customers prefer

online content while a good number also prefer the offline communication channels, such as posters, postcards, newspapers, and so on. To achieve maximum coverage of potential customers, Business Marketers must find a way to bridge the gap between digital destination, online content, and the paper-based communication media. In other words, there is need for easy access to both online and offline media contents via a single platform and this can lead to the much desired breakthrough in business marketing for small and medium scale enterprises.

Most business owners and entrepreneurs are quite unaware of the capabilities of the Quick Response Code Technology as a low cost tool for efficient product marketing especially now that majority of potential customers make use of mobile devices. Using the Quick Response (QR) code technology, it is possible to digitally connect consumers of your paper-based content to your online content in a matter of seconds. By reading and decoding the encrypted QR code with a smartphone, customers can gain access to business information that may not contain on a small business card. This is the missing link for the much desired breakthrough in business marketing for Small and Medium Scale Enterprises around the globe. The technology can be used to track information about products in a supply chain and to promote marketing and advertisement campaigns. Using this technology also, a smartphone user can gain instant access to product information, company website or social media pages.

In this paper we will discuss possible ways of promoting business marketing for a revolutionary breakthrough in commerce and industry via the Quick Response Code (QR code) Technology.

We will equally propose a model of the QR code technology that will be most appropriate for small and medium scale enterprises in Nigeria and in other nations of the world.

A Quick Response (QR) Code is a type of barcode that can be read easily using a digital device. Information stored by a QR code is usually seen as a series of pixels in a square-shaped grid. QR codes are square-shaped black-and-white symbols that people can scan using a smartphone by taking a snapshot of the image via a mobile phone's digital camera. These encrypted squares can hold links, coupons, event details, and other information that users might want to take with them for referring to later. Some QR codes can be found on direct mail, signage, billboards, and even commercials where potential customers can quickly scan them using their mobile phones. It can best be described as paper-based "hyperlinks". You simply take a picture of a QR code with your smartphone, and you are redirected to a website and other advertisement platforms using your mobile phone's web browser. QR Codes are so easy to use, and are so versatile that incorporating the technology into the company marketing plan can provide instant value to individuals and companies alike.

### 1.2. Aim of the Study

In this paper, we will achieve the following:

1. Expose the potential benefits of the Quick Response code technology on Business Marketing, especially for Small and Medium Scale Enterprises (SMEs), who can only afford little budget for affiliate marketing agencies

and other promotional marketing strategies.

2. Propose a new model of the Quick Response Code Technology to enhance marketing drive for small scale enterprises.
3. Make recommendations to further promote business marketing in the wake of increased use of mobile devices and information technology.

## 2. Literature Review

### 2.1. Meaning of QR Codes

QR Code, an abbreviation for Quick Response Code, is a machine-readable two-dimensional barcode [12]. QR Codes form part of the matrix (two-dimensional) barcode technology and are usually attached to items because the codes usually contain information about the items.

Some researchers have described QR code as a paper-based hyperlink, and that is an appropriate definition for it. It is "Quick Response" because it can be read and decoded quickly by a cell phone. They are used to take a piece of information from a transitory media and transfer same to your mobile device. According to Hirzallah, N., & Masalha, F. [5], Quick Response (QR) codes are a special type of barcode, a matrix-type (or two dimensional) barcode trade mark, which are optical, machine readable labels attached to items with a recorded information related to the item.

This information can then be read by any imaging device such as a camera, and decoded or processed using Reed–Solomon error correction for proper and accurate interpretation as required.

It is possible to see QR Codes in a magazine advert, on a billboard, a web page or even on t-shirt that someone is putting on. Once the information in the code is transferred to your mobile phone, it may give you details about the business, or details about the person wearing the t-shirt, and so on. It can equally show you a URL which you can click to have access to more information.

These machine-readable labels have the ability to store information both vertically and horizontally as opposed to conventional one-dimensional barcodes that could store information only in the horizontal plane [7].



Figure 1. A simple QR code.

Today, QR code system is the most useful type of two dimensional barcode technologies. It has become more popular than their barcode predecessor for two reasons:

- (i). Fast readability, and
- (ii). Greater storage capacity.

QR codes now have capacity for large data storage, and can be scanned by many modern mobile devices instead of requiring a bulky scanner to scan them.

Generally, a QR code is composed of black modules (Square dots) arranged in a square grid on a white background, and it can encode four standardized types of data, which are: numeric, alphanumeric, byte/binary, and kanji, or through supported extensions [5].

According to Kharat, S. A., Panage, B. M., & Nagarkar, S [6], QR codes can contain data for a locator, identifier, or tracker that points to various data sources, such as a website, a URL, an application, text, or other types of data, which can be easily read by cameras of mobile devices.

According to Wikipedia. (2020, August 17) [13], scanned QR codes can display text to the user, add a vCard contact to the user's device, open a Uniform Resource Identifier (URI), or connect to a wireless network, an email, or even a text message.

These technologies are now used for commercial tracking applications and convenience-oriented applications that targets mobile phone users. Notable areas of QR deployment

applications include product tracking, item identification, time tracking, document management, and general marketing.

Quick Response Code was first deployed in Japan in 1994. It was first introduced by Denso Wave, a subsidiary of Toyota. Denso Wave developed the QR code in an attempt to improve the manufacturing process and tracking of vehicles and vehicular parts, and to allow for a high speed component scanning or decoding of manufacturing information. Since then, there have been several standards aimed at improving its data holding capacity and faster encoding of information.

## 2.2. Data Encoding Standards of the Quick Response Code Technology

Quick Response codes have evolved several data encoding standards from its first patent by Denso Wave in 1994. As seen from Table 1, it was approved as an international standard in June 2000, and since then has assumed widespread acceptance globally.

**Table 1.** Data encoding standards of the QR code technology.

Standard	Date of Approval	Description
ISS-QR	October 1997	First Standard after the Denso patent. Approved by Japanese Association for Automatic Identification and Mobility.
JEIDA-55	March 1998	Japanese National Standard. Approved by Japanese Electronic Industry Development Association.
JIS X 0510	January 1999	Japanese Industrial Standards. First International Standard. Defined QR code models I and II symbols.
ISO/IEC 18004:2000	June 2000	Information technology – Automatic Identification and Data Capture Techniques – Bar code symbology specification. QR code (now withdrawn). Defined QR code 2005 symbols, an extension of QR code model II.
ISO/IEC 18004:2006	September 2006	Does not specify how to read QR code model I symbols, or require this for compliance. Information Technology – Automatic Identification and Data Capture Techniques QR Code 2005 bar code symbology Specification.
ISO/IEC 18004:2015	February 2015	Renamed QR Code 2005 symbol to QR Code and added clarification to it. Information Technology – Automatic Identification and Data Capture Techniques QR Code 2005 bar code symbology Specification.

## 2.3. Areas of QR code Technology Deployment

The widespread use of smart phones has led to the deployment of the Quick Response code technology and a wider range of its application in several aspects of our daily life. The embedded cameras of our mobile phones are mostly used as the QR code scanner. Today, QR codes are used over a much wider range of applications such as commercial tracking, entertainment and transport ticketing, product and loyalty marketing, as well as for in-store product labeling.

### 2.3.1. Advertising

QR code has become a new element in advertising strategy since it provides an easy way to access a company's website [9]. Using his mobile phone's camera as scanner, a potential customer can easily scan a QR code, displaying the code and converting it to some useful form such as a standard URL to access a website. This obviates the need for a user to type the URL into a web browser. The advertisers website is therefore

in the immediate purview of the prospect where a longer and more targeted sales can be pitched to the prospect.

### 2.3.2. Marketing

According to Okazaki, S., Li, H., & Hirose, M. [9], QR code can be used by marketers to link customers to Product-and-Service related information, promotion, and other services. In the same vein, [3] are of the view that these codes can equally be used for e-commerce communication.

### 2.3.3. Other Areas of QR Code Deployment

Other areas of QR code deployment include Inventory tracking and labeling of products in the manufacturing sector [17]. It can also be adopted in managing ticket activities in the transportation sector [8].

Md Shamim, H., Xiaoyan, Z., & MstFarjana, R. [7] is of the view that QR code can also support mobile ticketing, help in event promotion and in tourism location-based services. They are widely used in government offices to circulate instructions and various information, assist applications for

documents and permits, and simplify regular office activities. According to Md Shamim, H., Xiaoyan, Z., & Mst Farjana, R. [7], QR codes are also used as application tools in the social media such as WeChat, Facebook, and Snapchat.

The use of QR Codes was facilitated by the trend of marketing mobile phones with a QR Code-reading feature. According to Wave D. [19], the popularity of the code among the general public was due to its sheer convenience, as the QR Code is an open code that anyone is allowed to use.

#### **2.4. Scholarly Views and Evaluation of Existing QR Code Technology Implementations**

Md Shamim, H., Xiaoyan, Z., & Mst Farjana, R. [7] evaluated the impact of the Quick Response (QR) code technology on Customer Satisfaction in the online shopping context on the basis of perceived flow. They discovered that the implementation of QR code technology had a significant effect on perceived flow. According to the research, perceived flow significantly increased customers purchase intention and satisfaction. Their findings confirmed the significant effects of QR code systems on online community (retailing, marketing promotion, consumer behavior, advertisers and online shoppers). They further adduced that QR codes can influence customers to engage and share information with other customers in the online community, which will help to increase the volume of sales. It can combine different forms of marketing streams, thereby maximizing business exposure and generating more revenue (Estate QR Codes, 2016; Gramigna, 2016).

Rogers E. M. [14] outlined the various institutions that have adopted the use of two-dimensional barcodes, also known as QR codes for encoding information such as URLs which are easily read by smart phones, digital tablets and other electronic devices. Their report shows that these codes can serve as a vehicle to evoke a consumer response or some type of behavior. They went further to list out some of the major benefit of the technology, and the use of smartphones.

Results from a survey study of college students' awareness and use of QR codes indicate that QR code usage rate has a positive relationship with electronic device ownership [6]. They went further to propose a system based on the QR code, which is used to admit students into their lecture halls. According to them, the system will make use of the mobile technology to efficiently maximise approved lecture time. In their view, precious lecture time is usually wasted by instructors taking class attendance, especially for very large classes. Thus the need to automate this process by engaging the students to speed up the process. According to them, all that a student needs to do is to quickly scan the QR code to confirm his/her class attendance. The researchers further explained the high level implementation details of their system and show how the system verifies student identity and eliminated incidences of false registration.

According to Hayashi, F., & Bradford, T. [4], the implementation of the QR Code on the Starbucks Prepaid program in 2011 has increased the use of smartphones for Starbucks in-store purchases. Merchants put QR Code on

posters and advertisements to inform customers of QR scans via smartphone to get coupons or promotional and product information. Their research work proved that QR Code Technology can be applied with very low cost.

Sachdev, S. [15] defined the following four Pillars of Mobile Payment to help financial institutions determine mobile payment strategy:

- 1) Self-Paying: intended for transfer to bank account through mobile deposit and funds transfer capability features.
- 2) Paying Other People: uses Person-to-Person Payment (P2P) features for individual or group payments.
- 3) Paying Biller: making a payment to the biller through a mobile application owned by financial institutions or applications owned by the biller.
- 4) Paying Merchant / Retailer: a payment transaction platform on purchases at merchants using NFC sensors, QR code, cloud, or online.

In a related research work by [2], the researchers are of the view that the frequency of use of mobile payment for online purchases has increased the high number of online transactions. According to him, the method of payment has shifted through evolution, from the use of cash, debit cards, credit cards, and now Mobile Banking. It has also brought about changes in consumer behavior and is evident both in banking and retail services.

Results from [2] show that the future payment system will be integrated with telecommunications infrastructure and financial institutions for compatibility across a range of services, including its security solutions [2].

Mobile Payment currently has several payment methods, such as NFC, QR Code, and Online. Security development continues to be adopted to ensure mobile payment security. The results of Wang, Y., Hahn, C., & Sutrave, K. [18] show that there are four Security Challenges for Mobile Payment, namely: malware detection, multi-factor authentication, data breach prevention, and fraud prevention. Mobile Payment security issues, both service providers and users require ongoing security measures to ensure data security and prevent data breaches [18].

#### **2.5. Advantages and Disadvantages of QR Codes**

##### **2.5.1. Advantages**

The main advantage of QR Codes is their versatility. They can be used for nearly anything and are beneficial for both customers and businesses.

Another advantage is the ability of QR Codes to store a large amount of information including texts, videos, advertisements, business card information, personal information, and any other type of digital information [11]. Again, QR Codes combine different forms of marketing streams, thus maximizing business exposure and generating more revenue [17].

Furthermore, QR codes are extremely cost effective, as there are no start-up costs or monthly fees. In fact, many QR Code generators and readers are free. Using QR Codes can save paper by digitally displaying content with ease [12].

Finally, QR Codes are easily generated, and can be customized to suit promotional items, provide an easier way to manage the return on investment of one's marketing presence, and allow effective learning about the audience's interests [17].

### 2.5.2. Disadvantages

The major disadvantage of QR code is people's lack of familiarity with the technology. Although QR Codes can be found nearly anywhere, people do not know how to obtain the information they require. Another disadvantage is that a mobile device or a smartphone is needed, as well as a QR Code reader, in order to gain access to information stored within the Code [17].

## 3. Research Methodology

### 3.1. The Roger's Innovation Decision Process Theory

In this study, we adopted the Roger's Innovation Decision

Process Theory [14], which centers on the diffusion of innovation framework. According to this theory, diffusion of innovation increase or decrease the likelihood that members of a given culture will adopt a new idea, product, or practice [1]. It is believed that people's attitude toward a new technology is a key element in its diffusion.

Decision Process theory states that innovation diffusion is a process that happens over a period of time through five stages which include: knowledge, decision, persuasion, implementation and confirmation. According to MdShamim, H., Xiaoyan, Z., & MstFarjana, R. [7], the following are key elements of innovation diffusion: 1. Knowledge of an innovation, 2. Formation of an attitude toward the innovation, 3. A decision to adopt or reject, 4. Implementation of the new idea, and 5. Confirmation of this decision [14]. The theory is particularly suited for this study that seeks to introduce an innovative model of the Quick Response Code Technology for effective business marketing in Small Scale Enterprises.

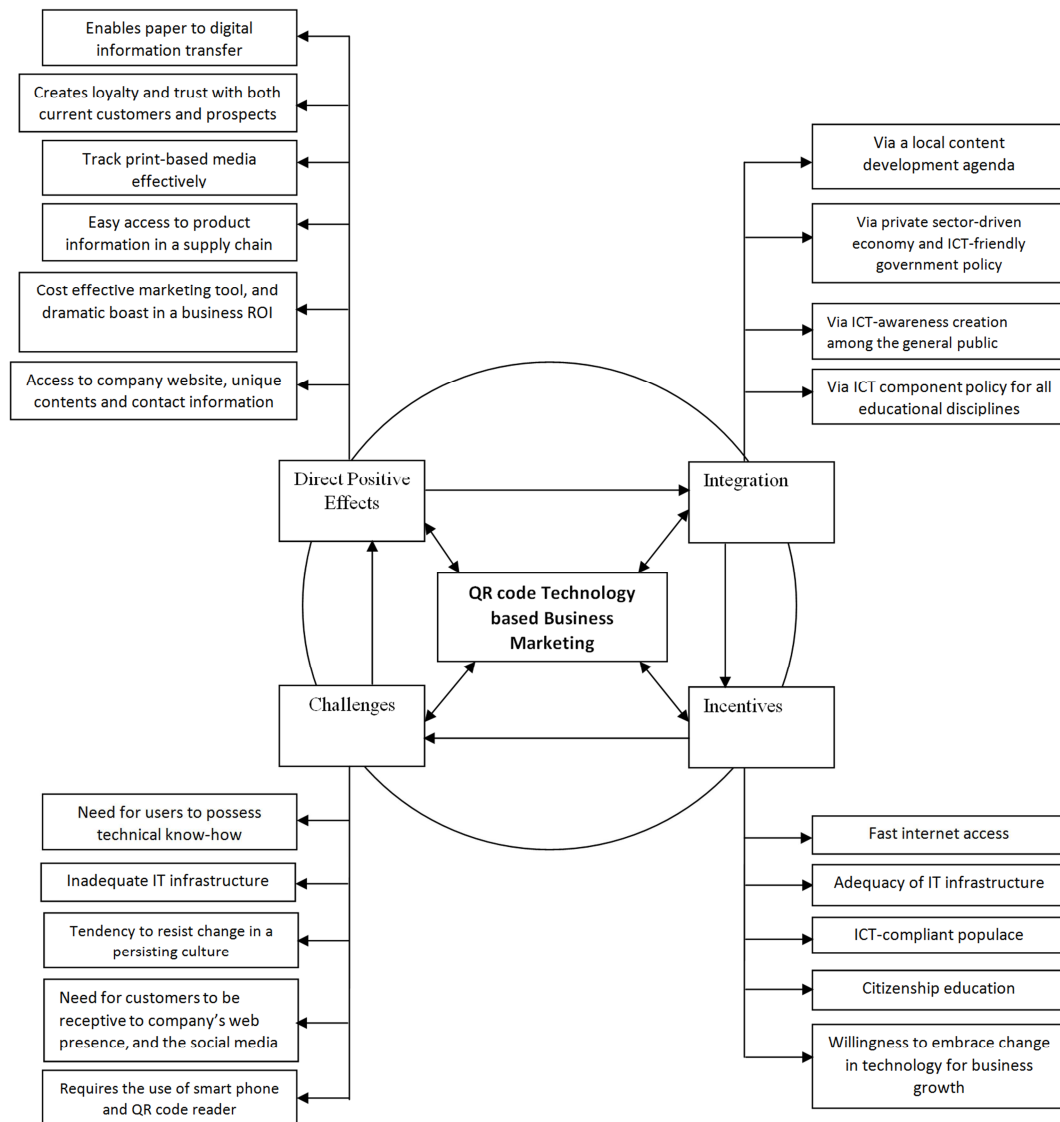


Figure 2. Proposed QR code Model for Enhanced Business Marketing.

### 3.2. The CIPP Evaluation Model

For proper analysis and design of our proposed QR code framework in this study, we adopted the CIPP Evaluation Model [10]. This model is a conceptual framework usually adopted by researchers on ICT implementations and impact evaluation [16]. The CIPP Evaluation Model is a comprehensive framework for guiding the evaluation of programs, projects, institutions, and systems particularly those aimed at effecting long-term, sustainable improvements [16]. The abbreviation CIPP represents Context, Input, Process, and Product evaluation.

## 4. Model Formulation and Discussions

### 4.1. Our Proposed QR code Technology Model for Business Marketing

The proposed QR code technology architecture for enhanced business marketing follows the Roger's Innovation Process theory and the CIPP evaluation mode earlier discussed. As seen in figure 2, the model is cyclical in nature, which reflects the central strength collectively provided by the identified components. It also shows that the assessment process can start from any of the components, which include: Direct positive effects, Challenges, Integration, and Incentives. Furthermore, the architecture depicts a conceptual framework showing the various activities involved in the proposed system.

The QR code model proposed in this study will combine different forms of marketing streams to maximize business exposure and generating more revenue, especially for small scale enterprises.

### 4.2. Interpretation and Discussions on Major Components of the Model

The proposed QR code Business Marketing Model is shown in figure 2. From the figure, major components associated with the framework include: Direct positive effects, Challenges, Integration, and Incentives.

#### 4.2.1. Direct Positive Effects

The first component of our QR code model is Direct Positive Effects. Positive effects of the QR code on business marketing is seen in the consequential benefits of paper to digital information transfer, creation of loyalty and trust with both customers and prospects, effective tracking of the print-based business promotion media, Access to company website, and contact information, easy access to product information in a supply chain, Cost effective marketing tool, and dramatic boost in a business's ROI. With this model, SMEs can combine different forms of marketing streams to maximize business exposure and generate more revenue.

#### 4.2.2. Integration

Proper integration of the QR code technology into business

marketing will require an ICT-friendly government policy, ICT awareness creation among the general public, local content development agenda, and an ICT component policy for all educational disciplines.

There is need to create enabling environment for proper integration of the QR code technology and other ICT-based systems into business marketing and other promotional programs.

#### 4.2.3. Incentives

Incentives for successful implementation of the QR code technology include the following: Fast internet access, adequate IT infrastructure, ICT-compliant population of users, citizenship education, and willingness to embrace change in a persisting culture.

#### 4.2.4. Challenges

The following challenges were identified as possible hindrances to full implementation and widespread diffusion of the Quick Response Code technology in business marketing: Need to possess technical know-how; inadequate IT infrastructure; Need for customers to be receptive to company's web presence, and the social media; possession of smartphones and QR code reader by prospective users; tendency to resist change in a persisting culture, among others.

## 5. Conclusion and Recommendations

### 5.1. Conclusion

In this paper, we have succeeded in exposing the potential benefits of the Quick Response code technology on Business Marketing for Small and Medium Scale Enterprises.

We have equally proposed a new model of the Quick Response Code Technology to enhance marketing drive for small scale businesses, which can bridge widening gap between digital or online content, and the paper-based communication media. The technology can be used to track information about products in a supply chain and to promote marketing and advertisement campaigns. By connecting consumers of paper-based content to the internet, a smart phone user can have access to product information, and gain access to company's website or social media pages.

Implementation of the new model is expected to promote business marketing in the wake of increased usage of mobile devices and information technology.

### 5.2. Recommendations

We recommend an early implementation of the findings of this research paper. The new model of Quick Response code technology proposed in this research paper is expected to improve business marketing and profit maximization.

There is need for governments to create enabling environment for proper integration of the QR code technology and other ICT-based systems into business

marketing and other promotional programs.

Government should provide adequate incentives for successful implementation of the new technology. Such incentives include provision of adequate IT infrastructure, and fast internet access among others. There is need for citizenship education to enhance their willingness to embrace technological change for more profitable business marketing. Government needs to make ICT-friendly business policies for stakeholders to take advantage of opportunities offered by the emergence of mobile devices and Information Technology to improve the sector.

## References

- [1] Adedokun-Shittu and Shittu (2013): "ICT impact assessment model: An extension of the CIPP and Kirkpatrick models. International HET review." Retrieved from <http://www.hetl.org/wp-content/shittu-Article.jpg>, 2013.
- [2] Bezovski, Z. (2016). The future of the mobile payment as electronic payment system. *European Journal of Business and Management*, 8 (8), 127-132.
- [3] Gao, J. Z., Prakash, L., & Jagatesan, R. (2018). Understanding 2D-barcode technology and applications in m-commerce-design and implementation of a 2D barcode processing solution. Gao, JZ, Prakash, L, Jagatesan, R. *Understanding 2D-barcode technology and applicComput. Soft. Appl. Conf.*, 2 (3).
- [4] Hayashi, F., & Bradford, T. (2014). Mobile payments: Merchants' perspectives. *Economic Review*, 99.
- [5] Hirzallah, N., & Masalha, F. (2014). A Students Attendance System using QR Code. *International Journal of Advanced Computer Science and Applications*, 5 (3), 75-79.
- [6] Kharat, S. A., Panage, B. M., & Nagarkar, S. (2017). Use of QR code and layar app for academic library services. *Librar Hi Tech News*, 34, 21-28.
- [7] Md Shamim, H., Xiaoyan, Z., & Mst Farjana, R. (2018). Examining the impact of QR codes on purchase intention and customer satisfaction on the basis of perceived flow. *International Journal of Engineering Business Management*, 10, 1-11.
- [8] Naagaraj, M. C. (2009). *Implementing QR Technology in Medical Device Package*. Thesis. Rochester: Rochester Institute of Technology.
- [9] Okazaki, S., Li, H., & Hirose, M. (2012). Benchmarking the use of QR code in mobile promotion: three studies in Japan. *J. Adv. Res.*, 52, 102-117.
- [10] Otuonye A. I. and Emeka C. (2017): "Using ICT Policy Framework as a Panacea for Economic Recession and Instability in Nigeria", *Journal of Future Internet*, volume 2, No. 1, June 2017. [www.mdpi.com/journal/futureinternet](http://www.mdpi.com/journal/futureinternet).
- [11] Ozkaya, E., Ozkaya, H. E., Roxas, J., Brayant, F., & Whitson, D. (2015). Factors affecting consumer usage of QR codes. *Journal of Direct, Data and Digital Marketing Practice*, 16 (3), 209-224.
- [12] Price K. (2013): QR Codes for trainers. *INFOLINE Tips, tools and intelligence for training*, 30 (1301). United States of America: Ana Foreman.
- [13] Wikipedia. (2020, August 17). QR code. Retrieved from [wikipedia.com](http://wikipedia.com): [www.wikipedia.com](http://wikipedia.com).
- [14] Rogers E. M. (2003): *Diffusion of innovations*, 5th ed. New York: Free Press, 2003.
- [15] Sachdev, S. (2014). *The Four Pillars of Mobile Payments - Immediate Opportunities*. Brookfield: Fiserv, Inc.
- [16] Stufflebeam D. L. (2007): "CIPP evaluation model." Retrieved from [http://www.cglrc.cgiar.org/icraf/toolkit/The\\_CIPP\\_evaluation\\_model.htm](http://www.cglrc.cgiar.org/icraf/toolkit/The_CIPP_evaluation_model.htm), 2007.
- [17] Tashmika Ramdav (2018): "The use and benefits of Quick Response Codes for construction materials in South Africa", *Acta Structilia*.
- [18] Wang, Y., Hahn, C., & Sutrave, K. (2016, February). Mobile payment security, threats, and challenges. In *2016 second international conference on mobile and secure services (MobiSecServ)* (pp. 1-5). IEEE.
- [19] Wave D. (2016): History of QR Codes. [online]. Available at: [www.qrcode.com/en/about/](http://www.qrcode.com/en/about/) [Accessed: September, 2020].