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Online Shopping on the Go: An assessment of QR Code Utilization among African University Students in China

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Abstract:

Quick Response (QR) code utilization has exploded in China to a higher extent compared to other Western countries. QR codes have become part and parcel of the digital world and the online shopping environment in China. This study adopted the Theory of Diffusion of Innovations (DOI) as the theoretical framework of this study, to investigate the perceptions of how African students use QR codes for online shopping within China. The study utilized an online questionnaire design to collect data from 615 African students from 9 countries studying in 10 purposively sampled Chinese universities. One key finding of our study shows that the type of QR code mostly used among African students is the product information types and their reason for opting for the product information QR code type is mainly for searching for the right product before they do online shopping or buy. Our study also reported that despite some challenges identified by respondents, which include: the acquisition of a smartphone and the need to download an app, there a general level of acceptance of QR codes among African students in China. In conclusion, 55.9% of the sampled African students for this studying in China specified they were ready to recommend QR code usage in their respective African countries for online shopping.

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Introduction

Over the last few years, the popularity of online shopping has tremendously grown around the world. Many people are now depending on online shopping to buy all kinds of goods and services. In the year 1994, there was the development of Quick Response codes by Denso Wave which was one of the Toyota subsidiaries companies. The codes were developed to track car components during the manufacturing and distribution period. Denso Wave is known to hold a patent for QR codes. However, it has managed to make the technology widely available. The invention has made the use of black and black pixelated squares to rapidly increase because they can contain more information compared to the usual bar code in a 10th of the space. A digital economy report by United Nations Conference on Trade and Development (UNCTD), 2019, mentioned that QR codes can be made easily through several websites. They can link to some of the simple text, a website, an email template, or just a simple text message. They are also able to make a phone call, access PDF, or show a geographical location. An increase in the number of smartphones that have cameras has brought about QR codes being used in some commercial applications such as marketing, management of tickets in the transportation industry, and applications like snap chats. The codes have also proven to have great value in marketing. Technology has played a greater role in facilitating much online shopping for both goods and services. According to Pal, and Jha, (2017), QR codes can provide a means through which temporary links to a variety of online shops are used to reduce consumers' extraneous cognitive load. According to Sentence, (2019), several limitations are associated with QR codes as far as online shopping is concerned. There is a need to thoroughly scan them by the use of a device. They are useful when they are displayed through the screen. Nevertheless, they can be easily made and used and can be scanned by the use of a mobile device. In online stores, they are mainly used to package promotional items because they have a simple way of going to an online store to improve mobile commerce strategy. In this article, we aimed to assess the evolution of QR code, use of QR codes specifically for online shopping, and identify international students' perceptions towards the use of QR code as well as any other kind of challenge faced during the use of QR code for online shopping in China (Digital Marketing Essentials for China, 2020, p. 42).

Review of Literature

The Evolution Quick Response Code (QRC)

Denson Wave developed QRCs in 1994 as one of the ways of managing their portfolio the main objective of QRC, according to Toyota Company, was to come up with a good inventory and a tracking system within the manufacturing unit. On the contrary, the company decided to share the technology with the public in 1994 (Aktaş, 2017, p.6; Trivedi, 2019 and Pew Research Center, 2018). Du, & Li., (2019), described mobile commerce as a set of applications that can enable people to access services from their mobile devices through the use of the internet. Due to the high rate of growth of digital media and smartphone usage in the United States, the country emerged as the first in the adoption and usage of QRCs (Aktaş, 2017, p. 11). According to Reportlinker, (2020), China has proven to be the fastest-growing country in terms of mobile payments. In the first quarter of 2020, China experienced a mobile transaction volume of around 59.7 trillion-yuan payments. This was way ahead of some of the advanced nations of the world.

As highlighted by the Pew Research Center, (2018), the increasing development and utilization of information and communication technology (ICT), as well as mobile technologies, have certainly enabled the development of new or up-to-date media product ideas and combinations. Specifically, the QR code forms a new medium of communication that

offers a merging of both analog communication technologies and digital communication technologies. According to Aktas, (2017), as a new communication media, the QR Code entails an amalgamation of not only information and communication technology, but also mobile technologies. Consequently, this important communication media provides communication scholars with modern communication platforms that allow them to simultaneously use both analog as well as digital media communication technologies. Indeed, not only are the analog as well as digital communication media available presently, but also the hybrid media of communication, which makes use of both the technologies together. According to Aktas, (2017), the hybrid media of communication entails an amalgam of not just the contents and the functionalities of the digital media, but also the print media. As argued by Beaconsta, (2020) and Denso Wave, (2020), today, the significant use of the QR Code can be seen through its application in a wide number of areas including marketing, entertainment; TV broadcasting; commercial tracking systems; traditional print newspapers; in-store product labeling; traditional publishing of books, and websites. The QR Code may thus be applied with not only the print media, but also other types of media, including TV programs and commercials, and web pages.

Indeed, as a commonly-used medium of communication within the media industry, the QR Code warrants some study or research by communication and digital governance scholars. Aktas, (2017, p.29) argues that it is considered that the hybrid medium of communication media will have an important place within the communication media industry shortly. Again, Aktas, (2017, p.29) further indicated that, the reality that QR Codes often undergo in-depth examination not only in terms of the technical specifications about communication technologies and new media but also their functional properties. The main goal is to provide important information regarding the QR Code technology in terms of the financial and technical bases relating to the communication technology as well as the new media. Alternatively, the secondary goal is to identify the primary use as well as the drawbacks associated with the QR Code and consequently recommend solutions aimed at eliminating the potential impediments to its extensive use. The technology is projected to entirely transform how individuals access as well as retrieve information. Certainly, its capability to avoid the search engines while one is accessing as well as retrieving essential information while online makes it a ground-breaking innovation. Directly, accessing information online via the traditional media of communication can be tiring amid today's overflow of information, hence a matter that ought to be given urgent consideration by the communication scholars.

Communication media have undoubtedly had a significant impact as far as civil institutions and social organizations in any given society are concerned. As argued by McGivern, (2016), new media not only transforms the social organization structures but also generates new forms or kinds of information, in addition to occasionally shifting the focus of the political power. Accordingly, McLuhan & Fiore, (2001) communication media is not only presently reshaping as well as restructuring the social interdependence patterns, but also transforming every aspect of our individual lives. Given this, it is compelling us to re-evaluate as well as re-consider nearly every action, thought as well as every institution that was previously undervalued. Without a doubt, everything seems to be changing and there is currently no doubt that societies have often been significantly influenced by the type of media used by men to communicate more than the communication content. Consequently, Castells, (2013) cites that culture is mediated as well as enacted through communication, with culture being our historically-produced belief systems and codes that become fundamentally transmuted, and more so, by the modern technological system after a given time. As an important new medium of communication, the QR Codes have an essential impact on the social culture with

this influence argued to continue expanding in the future. It forms a hybrid cultural structure as it facilitates the merging of analog communication technologies and digital technologies.

QR Code Application/Usage

The QR Code is presently mainly used for payment services, marketing purposes, as well as numerous industry worthwhile use-cases. Given this, it is reasonable to state that approximately 60-65% of individuals globally make use of the QR Codes for their daily aforementioned uses (Beaconstac, 2020). As stated by Du, & Li, (2019), Beaconstac, (2020), and Digital Marketing Blog, (2020), QRCs have certainly become popular within organizations, particularly small businesses, employing this technology as a means of promoting their business activities at a reduced expense. Du, & Li, (2019) further state that QRC is turning out to be an essential part of mobile as well as online marketing programs. Beaconstac, (2020) & Digital Marketing Blog, (2020) state that Chinese consumers and consumers in various parts of the globe are now 67 percent aware of QRC, a factor attributed to various sources such as magazines, newspapers, flyers, catalogs, business cards as well as other sources of media such as mobile phones, which they can use to access various information entrenched in those particular codes.

There are numerous cases of QRC-enabled approaches where consumers instigate the process of communication. For instance, Du, & Li, (2019) noted that, to enhance the popularity or attractiveness of their various menu items, various online shops across the globe place QRCs in their product packaging as a means of providing additional information regarding the food. According to the Bureau of Transportation Tokyo Metropolitan Government, (2020), QRC technology has also been employed by Metro as well as bus stations worldwide to offer extra information to travelers. Xu, Munson & Zeng, (2017) investigated various new methods of generating QRCs aimed at not only enhancing the customization and the artistic look but also its application in as far as library bibliographic records are concerned. The study thereafter developed a more efficient procedure aimed at creating QRCs meant for Library bibliographic records. Brooks, et al., (2019) analyzed how the QRCs may be employed to develop the fastener industry-proposed the integration of QRCs with mobile marketing, a move aimed at directing consumers to a mobile-friendly website through which they can purchase fasteners. Brooks et al., (2019) employed the perspective of the uses and gratifications theory, simply known as the U&G theory, to assess the willingness of the potential consumers to scan QRCs printed within the packaging. Brooks et al., (2019) found out that consumers would examine the codes whenever they had faith in the eco-friendly labels its accompanying QRCs. Consequently, business organizations ought to focus on the trustworthiness of their product claims, even as the government guidelines promote consumer recognition of the pull-based mobile advertising via the embedded QRC as compared to placing wordy content on product packaging, which may be less trustworthy. As noted by the Digital Marketing Blog, (2020), Beaconstac, (2020) & the Digital Marketing Essentials for China, (2020), the QR Code usage can be classified into six major categories which include products/organization, name tags, recruitment, donation campaign, event information, and miscellaneous applications. A report by EWIT, (2018) & Digital Marketing Blog, (2020), in 2016 Walmart established an essential Walmart Pay app, enabling its buyers to utilize the QRCs to conduct payments. During their check out, clients open this important pay app, enter their respective pins, and ultimately scan the QR Code. EWIT, (2018) and Digital Marketing Blog, (2020) argue that this instigates the payment information that is stored within the app, and the payment is actualized. Imingle, (2018) notes that auto insurance is also employing the QRCs to enable their clients to pay their respective bills. Buyers receive an essential paper bill in their emails accompanied by a QRC. The customers

are provided with the option of scanning the codes and thereafter pay their respective bills without having to enter their login information. Atlas Financial, which is one of the main commercial insurers of vehicles in the US, was able to launch a mobile that is enabled by technology with the main aim of claiming to report. This modern technology enables the insurer's commercial auto policyholders to present their claim notice to the company using mobile gadgets. The mobile applications employ the use of QRC technology, enabling policyholders to convey essential information and pictures from an accident scene (EWIT, 2018).

QR Code Use in Online Shopping

EWIT, (2018) cited that online buyers ought to use the QR Code as these codes ensure a better level of connectivity with the consumers, a factor that can secure commitment to a given brand. Hossain, Zhou & Rahman, (2018) also mentions that the QR codes offer exceptional tracking as well as traceability functions. According to Hossain, Zhou & Rahman, (2018), some software or code reader programs can crack various codes. By making use of this particular code reader software, Megalingam, et al., (2019) argue that it becomes easier for marketers to ascertain the precise code scan numbers per day or month. The various set of devices such as laptops, mobile, or other devices was employed in scanning the QR code with the scan executing not only the time and website browsing interval but also the location of every individual shopper. Cheong, et al., (2017) highlight that QR Code information allows online buyers to understand not only the kinds of products being sold but also how they are customized. The QR codes also allow businesses to quickly assess consumer interests. The businesses can link online shops with their customers in real-time, in addition to enabling them ~~to~~ instantly assess the importance of consumers towards a given campaign or even a product. Certainly, by scrutinizing the scans, the businesses can establish the effectiveness of the marketing campaigns. The entrenched QR codes on the promotional image can arouse buyers' curiosity to spot the marketing materials offered by a given marketer, which forms one of the most essential benefits of those particular codes for an organization's promotion. O'Malley, (2018) argues that the QR codes can entice consumers from the offline media into using the online platforms, such as the press and outdoor advertisement campaigns. The cost-effectiveness nature of these particular codes as important marketing as well as advertising tool forms another benefit for marketers. When embedded into the promotion ads, the QR codes enable customers to visit company websites, enabling them to acquire additional information, access appropriate information, download essential content, enter sweepstakes, in addition to helping them familiarize themselves with the various social media sites during shopping. Codes also enable businesses to establish their return on investment from the online business. Nguyen et al., (2019) also observed that printing the QR codes presented on print advertising often provides effective interactivity, enabling the merchants to track various customer data, such as the customer's browsing duration on the website, customer's geographical location, and the QR codes scan frequency. The acquired data is very essential for marketers in terms of evaluating the effectiveness of their respective marketing campaigns.

Priyadarsini et al. (2019) described that the QR codes facilitate connectivity with the consumers, allowing them to act employing the direct mail. Certainly, this capability of the QR code eradicates several barriers, including time delays as slow response is usually one major reason behind the loss of interest amongst consumers. Consequently, the code's capability to provide a lot of information within a significantly short period, especially during the thinking phase for a consumer regarding a product/service allows an instantaneous connection with them. Loketkrawee & Bhatiasevi, (2018) and Uzun & Bilgin, (2016) cite that online shoppers

can also acquire a significant return on business investment in addition to a response level from their organization campaign activities by integrating the QR code with the traditional, direct marketing. QR codes facilitate the acquisition of important information concerning shoppers' information, response rates, and demographic information. Besides, Loketkrawee & Bhatiasevi, (2018) indicate that QR codes facilitate the collection of consumer reviews via company websites. After acquiring online reviews, businesses can effectively understand consumer behaviors. QR codes also help businesses to understand consumers' demands by establishing the rate of scans associated with every code. The codes may be effortlessly shared in the different social media platforms with product images that shape buying intention (Smith, 2017; Siva, et al., 2020 and Trivedi, Teichert & Hardeck, 2019). Wise (2018) cites that marketers ought to develop as well as maintain well-designed databases aimed at evaluating not just the needs, but also the wants of consumers from the consumers' browsing behavior. Marketers may employ the use of these particular codes to provide links for specified website page URLs as well as use the codes to acquire various information, comprising of questionnaires, needs-and-wants-related information, voting, and product ranking, and so forth. The acquired information is thereafter analyzed to establish suitable offerings for the potential or target customer. According to Pierce, (2017), those codes that are associated with websites and email addresses may help to obtain more data during the process of registration, including browsing time and content downloading time. QR codes that have embedded websites sway consumers to buy products or services from a given virtual shopping site. These particular codes may be used with a personalized URL. Personalized URL (PURL) offers a significantly unique Web address for every consumer as it can offer more specific information for every customer (Pimple, 2018).

QR Code for Online Shopping within China

As highlighted by Stein, (2020), China forms one of the globe's major users of QR codes. Their approval of this particular technology has resulted in the QR codes being utilized in various smart ways to not only improve marketing campaigns but also day-to-day life. Indeed, according to recent statistics from Statista, (2020) and Worldometers, (2020), as of December 2020, China has a recorded 986 million individuals with access to the internet via a mobile device, with over 900 million of the recorded numbers using WeChat or Weixin (Chinese version), a common app that possesses similar functions like Facebook and WhatsApp. WeChat apps contain an in-built QR code scanner. Given this, every moment the WeChat app is downloaded to a given gadget, a QR code reader is downloaded as well. According to Yuan, (2017), Ying (2019), and Xu, Munson & Zeng, (2017), over 900 million such scanners are floating amongst the Chinese public, not including those staying abroad. According to Zhang et al., (2017) and Xu, Munson & Zeng, (2017), QR codes are not only popular in the Chinese, but are also becoming inevitability in the increasingly cashless society. To ensure the Chinese consumers notice your offerings, businesses must focus their attention on where their potential consumers prefer hanging out as well as how they network. Wang, (2017) and Cheong et al., (2017), and Chang, et al., (2018) conclude that QR codes are certainly now part and parcel of China's online market. Yuan, (2017) indicates that the leading third-party, online payment service within the Chinese digital market space is Alipay, followed by WeChat pay. These particular e-wallet services are often linked to a consumer's bank account in addition to being based around QR codes. For ease of carrying out payment, a larger number of stores within China currently acknowledge Alipay and WeChat pay. Customers only require to scan the code to facilitate instant payments. Smaller stores, on the other hand, often scan the code on the consumer's mobile phone and thereafter transfer the payment to their respective account.

The digital marketing China blog, (2020) clarifies that the most fulfilling usage of the QR codes from the perspective of online users is to acquire something for completely nothing. Beaconstac, (2020), indicated that QR codes are for virtual shopping in this mobile era, and QR codes have certainly become the link between off-line and on-line. They are currently featured on most receipts, packaging, as well as offline advertising, including leaflets and billboards. They are essential to driving online traffic, engaging consumers off-line, and attracting them to an organization's online marketing campaign. It is certainly a significantly cost-effective strategy to enhance one's subscriber numbers on social networking sites, in addition to encouraging increased engagement with one's products or services online. Besides, it also facilitates cross-platform online promotions. Pierce, (2017), and Pimple, (2018) state that, in China, one needs to transform the majority of followers digitally since users are now used to carrying out business transactions in this manner. The online sales structure within the Chinese is among the most developed globally, with QR codes being used to sway consumers to purchase online.

Theoretical Underpinning of the study

To understand how African students in China adopted the use of QRCs for online shopping, this study adopted the theory Diffusion of Innovations (DOI) as a theoretical basis.

The Theory of Diffusion of Innovations

The Diffusion of Innovations (DOI), is a theory offered by Rogers and is built around four factors, including time, innovation, communication channel, and social system (Rogers, 1983, pp.14-26 and Rogers,2003, pp.45-89). According to Rogers, diffusion is simply a communication process using specific media within the social system, and which also influences the "new" (Rogers, 1983, pp.14-26 and Rogers,2003, pp.45-89). In his theory, Rogers described "innovation" as a concept, an object, or an application that is deemed as new by individuals or organizations (Rogers, 1983, pp.14-26 and Rogers,2003, pp.45-89). Dearing, & Cox, (2018), on the other hand, argue that "innovation" does not necessarily have to be an unfamiliar design or a concept. Instead, Dearing & Cox, (2018) argue that it is right to say that an individual or an organization has not applied it before. Roger's model has five major phases, including the following (Rogers, 1983, pp.14-26 and Rogers,2003, pp.45-89, Rush, 2019):

i. Knowledge: Individuals acquires information regarding not only an innovation but also its application
ii. Persuasion: The individual assesses the positive as well as the negative aspects of the innovation, shaping his/her perception accordingly
iii. Decision: In this particular stage, the individual either rejects or accepts the innovation
iv. Implementation: This particular stage exists only if an individual's decision-making stage is concluded positively
v. Confirmation: The Individual confirms as well as strengthens his/her adoption decision.

Base on the literature review and the theoretical framework, the following research questions were used to investigate the perceptions of African students in China about the use of QR codes for online shopping;

Research Questions (QR)

QR 1. What are the knowledge levels of participants about QR codes for online shopping?
QR 2. What type of QR code do participants normally use for online shopping, and why?
QR 3. What are the perceptions of participants about using QR codes for online shopping?
QR 4. What are the challenges of using QR codes for online shopping?

Materials and Methods

This study adopted qualitative and quantitative methods. The mixed-method is relevant to this study, since, it enables the researchers to apply the advantages of both qualitative and quantitative methods in the sampling and data analysis of this study (Creswell, 2016 and Bhat, 2019). Due to the COVID-19 and its effects on university education disruption, the researchers adopted the online survey questionnaire because it was the most appropriate means for collecting data quickly and in large volumes, at low costs (Fielding, Lee, & Blank, 2017). The questionnaire for the online survey was designed based on the research questions to solicit information about the knowledge levels, the type of QR code used by African students, the general perceptions of participants about using QR codes for online shopping, and some key challenges that participants encounter in using QR codes for shopping. A total of 25, 5-point Likert-type scale questions were formulated with options from *1= strongly disagree to 5 = strongly agree* to collect information from the respondents. The first section of the questionnaire consisted of the participants' demographic background, such as gender, name of institution, educational level, country of origin, and age. The second part is made up of questions on respondent's knowledge of QR codes for online shopping between November and December 2020. The third section of the questionnaire is made use of questions on the type of QR codes participants normally use for their online shopping. The next section of the questionnaire was meant to have respondents' assessment and perceptions of the QR code they currently used for online shopping. The last section of the survey had the main questions that were meant to evaluate respondents' challenges they face in the use of QR codes for online shopping study. A total of 615 questionnaires were distributed. Out of 615 distributed, 590 questionnaires were validly responded to, representing 95.9 % of the total sampled population. There was a pilot test (sample size 25) and a pretest (sample size 10) that was carried out before the final data capturing. Some of the statements were modified in the original questionnaire. The respondents were African students from 9 different countries studying in 10 purposively sampled Chinese universities. The choice for African students is based on the fact that QR code usage in most African countries is either limited or non-existence, hence this study enabled the researchers to understand the perceptions and challenges that African students studying in China go through, in their bid to buy online. The final data was analyzed via SSPS and percentages, Standard deviations used for analysis study.

Research Analysis and Findings

The data was collected from several countries. Respondents received the questionnaire through an online survey link and 590 valid responses were collected from participants. All the respondents in this particular study possessed either a smartphone or a tablet with Android OS.

Demographic Characteristics of Respondents

The detailed demographics of the respondents show that 406 representing 68.8% of the sample were male and 184 representing 31.2% was female. Ages range between 21 and 50 years, with most of them (47.8%) ranging between 31 and 40 years. The sample represented those with adequate education, with 73.2% being Masters and above. Regarding the nationality of respondents, 35.3.6% of respondents were from Ethiopia, 29.7% from Ghana, 13.9% from South Sudan, 7.6% from Nigeria, 14.7% from Botswana, 3.9% from Egypt, 2.1% from South Africa, 1.5% Uganda, and 1.2% from Rwanda. See Table (1);

Table 1: Demographic Characteristics of Respondents

Variables	Category	Frequency	Percent
Age			
	21-30	170	28.8
	31-40	282	47.8
	41-50	131	22.2
	51+	7	1.2
Sex			
	Male	406	68.8
	Female	281	31.2
	Others	8	1.5
Educational level			
	Diploma	22	3.7
	Bachelor's degree	136	23.1
	Masters and above	432	73.2
Nationality			
	Ghana	176	29.8
	South Sudan	82	13.9
	Ethiopia	208	35.3
	Nigeria	45	7.6
	Egypt	23	3.9
	Uganda	9	1.5
	South Africa	12	2.0
	Botswana	28	4.7
	Rwanda	7	1.2

Respondents Knowledge of QR Codes

Concerning respondents' opinions on the extent participants know about QR code purposely for online shopping, the average rating is 3.5 for all the statements apart from the one relating to the one using QR for *other purposes with an average of* 2.46 (. It is worth noting that despite the study outcome, it is apparent that QR codes enable the easier and quicker transfer of information when the information is needed during the decision-making process, especially online shopping. The benefits expected was that QR codes would help get more data regarding the product, (528 of the 590 respondents, meaning 89.5 % of the interviewees partly agreed or strongly agreed with the research question that was posed. Most interviewees agreed to the fact that QR codes help to get a coupon, discount, or deal (503 of the interviewees somewhat agreed, or strongly agreed with the information), to buy a product (502), and for other purposes (372). (See table 2);

Table 2: Respondents Knowledge of QR Codes

	Strongly disagree	Somewhat disagree	Neither agrees	Somewhat agree	Strongly agree	mean
To receive more information about a product	366	162	16	8	38	3.86
To get a coupon, discount or deal	279	224	29	20	38	3.63
To buy a product	300	202	24	24	40	3.56
Other	173	189	118	58	52	2.46

Note: *[Strongly Disagree (1), somewhat disagree (2), neither agree (3), Agree (4), & Strongly Agree (5)]*

The analysis from table 2.1 strongly indicates a strong association (r=0.564 at 1% level) that occurs between those who scan QR codes to receive more information about a product and those who scan QR codes to buy a product.

Table 2.1: Correlation between those who scan QR codes to receive more information about a product and those who scan QR codes to buy a product

		To receive more information about a product
To buy a product	Pearson Correlation	.564
	Sig. (2-tailed)	.000
	N	590
	Sig. (2-tailed)	
	N	590

There is a strong correlation (r=0.522 at 1%) which exists between people who are inclined to them that use QR codes to get a coupon, discount, or deal and those who use QR codes for other reasons.

Table 2.2: correlation between using QR codes for Discounts and other reasons

		Other
To get a coupon, discount, or deal	Pearson Correlation	.522
	Sig. (2-tailed)	.000
	N	590
	Sig. (2-tailed)	
	N	590

The type of QR code participants normally use, and why

Table 3 below summarizes responses to six questions regarding the type of QR codes participants normally use. The majority of respondents use QR codes to buy a product with a mean of (μ = 4.06) and a standard deviation of.96, To receive more information about a product (μ = 4.86) and a standard deviation of .16, to get a coupon, discount or deal (μ = 4.04) and a standard deviation of .75, access location of shops through the map (μ = 3.7) and a standard deviation of .86, and using QR codes for other purposes (μ = 2.45) and a standard deviation of 1.04.

Table 3: type of QR code participants normally use, and why

Measurement Items	Mean	SD
To buy a product	4.06	.96
To receive more information about a product	4.86	.16
To get a coupon, discount, or deal	4.04	.75
Access the location of shops through the map	3.98	.86
Access online shops contact information	3.75	.86
Other	2.45	1.04

Note: *[Strongly Disagree (1), somewhat disagree (2), Neither agree (3), Agree (4), & Strongly Agree (5)]*

The perceptions of participants of the ease of using QR Codes

In table 4 indicates the analysis of the perceptions of participants currently using QR codes for online shopping. The table also has the average of each instrument as well as the cumulative variance of every instrument (μ =4.41, CV=.53), QR codes enhance the shopping experience (μ =4.44, CV=.55), QR codes influence the shopping process (μ =4.43, CV=.52), QR codes increase brand-client interactivity (μ =4.49, CV=.1), and other (μ =4.49, CV=.62). (see table 4 below)

Table 4: perceptions of participants of the ease of using QR Codes

Variables	Sample	
	Mean	**CV**
QR codes can be scanned easily through the use of a mobile phone	4.41	.53
QR codes improve shopping capability	4.44	.55
QR codes play a role in impacting the process of shopping	4.43	.52
QR codes heighten the interactivity of the brand-client	4.49	.41
Other	3.23	.62

Note: *[1= (strongly disagree), 2= (somewhat disagree), 3= (neither agree), 4= (somewhat agree), 5= (Strongly agree)]*

The opinions of respondents about the challenges of using QR code for online shopping

Concerning respondents' opinions about the challenges of using QR codes for online shopping, the mean rating is above 3.5 for all the statements. 292 representing 49.5% of the respondents either somewhat agree or strongly agree with an average of (μ = 3.56) that to use QR code, one must use a smartphone, 305 representing 51.7% somewhat agree or strongly agree with an average of (μ = 3.59) that online shops and businesses are not always using codes responsibly, and 291 representing 49.2% somewhat agree or strongly agree with an average of (μ = 3.48) that QR codes need the user to download an app before they can be scanned.

Table 5: Challenges of using QR code for online shopping

	Strongly agree	Somewhat agree	Neither agrees	Somewhat disagree	Strongly disagree	Mean
To use a QR code, one must use a smartphone.	270	22	30	246	22	3.56
Online shops and businesses are not always using codes responsibly	287	18	32	227	26	3.59
QR codes need the user to download an app before they can be scanned	267	24	26	241	32	3.48

Note*: [Strongly Disagree (1), somewhat disagree (2), Neither agree (3), Agree (4), & Strongly Agree (5)]*

There is a solid correlation (r=0.552 at 1%) that takes place between the believers who consider using a QR code, one must use a smartphone, and those who believe QR codes need the user to download an app before they can be scan.

Table 5.1 correlation between using QR demand smartphone and download of an app

		QR codes need the user to download an app before they can be scanned
To use a QR code, one must use a smartphone.	Pearson Correlation	.552
	Sig. (2-tailed)	.000
	N	590
	Sig. (2-tailed)	
	N	590

Table 5.1 of the analysis of this study illustrates the satisfaction of using QR codes for online shopping and as to whether respondents will you recommend the use of QR code for online shopping in their home countries.

Table 5.2 has a frequency of three choices namely 'Yes' with 330 representing (55.9%), next is 'No' with a frequency of 214 representing (36.3%), and lastly, "Neutral" with a frequency of 46 representing (7.8%). This indicates that the majority of respondents will recommend the use of QR codes for online shopping in their various countries.

Table 5.2: Recommendation of QR code use in respondents home countries

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	330	55.9	55.9	55.9
No	214	36.3	36.3	92.2
Neutral	46	7.8	7.8	100.0
Total	590	100.0	100.0	

Discussions and Conclusions

A total of 590 out of 615 respondents participated in this study. The study also sought to get the responses to the following Research Questions: To what extent do participants know about QR codes for online shopping, what type of QR code do participants normally use, and why? what are the perceptions of participants currently using QR codes for online shopping, and what are the challenges of using QR codes for online shopping?

Our study reported that even though QR codes are not so common in most African countries, our findings show that African students in China have considerable knowledge of QR code utilization in China. Another finding from our study stipulates that the product information QR code type is mostly used among African students for online shopping in China. The respondents reported that the information QR code types enable them to search for suitable product information before they do online shipping. Respondents again suggested that information QR codes offer them the opportunity to get much insight into the product specifications before buying or doing online shopping. The acceptance of QR codes by African students is hinged on the principles underline in the theories of Diffusion of Innovations and Uses and Gratifications. Generally, QR codes are not popular in most countries in Africa, this study, therefore, confirms the application of Uses and Gratifications and Diffusion of Innovations theories to this study. Our study is therefore in line with Rush, (2019), who indicated that satisfaction, Knowledge, persuasion, decision, implementation, and confirmation sufficient conditions for the acceptance and diffusion of new technologies. To conclude, our findings specify that, despite some challenges identified by respondents, which include: *compulsory acquisition of a smartphone, internet bundle cost, and the need to download an app,* there a general level of acceptance, use, and satisfaction of QR codes among African students in China is generally high. Other key findings show that some 55.9% of the sampled African students for this study, indicated that they are encouraged to use QR codes for online shopping frequently due to its ease of use, and the secured nature of the digital governance system in China. Finally, respondents indicated that they will be willing to recommend the use of QR codes for online shopping in their various African countries.

Limitations and Future Research

The participants in the study were limited to university students, therefore the findings of this study must not be generalized to the larger population. This is because previous researches indicate that experience, age differences, and exposure play a big role in determining the rate of adoption of new technology (Aktaş, 2017, p.17). Future research

could be carried out among the participants with varied backgrounds and nationalities to give a clearer understanding of the utilization of QR codes in China. Future researchers could also investigate the comparison between students from other advanced nations with those from the developing world to get a clearer picture of the perceptions of using QR codes for online shopping.

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