

## Enhancing Mobile Shopping Experience Using QR Code: An Exploratory Study

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### Abstract

Quick Response (QR) codes are increasingly visible in various fields. With advances in QR code, mobile shopping is becoming one of the most important channels in the retail industries. The aims of this research are to discover the willingness of the Malaysian university community to use QR codes in the buying process using smartphones as well as their perception about the functionality and usefulness of QR Codes. Through review of literature and responses from interviews, the article firstly clarified the characteristics and applicability of the QR Codes, especially in retail. This research applied design thinking methodology that provides a solution-based approach to solving problems. It is found that the use of smartphones and QR codes for mobile shopping has become increasingly popular and has enhanced users' shopping experience. Users can easily purchase products by engaging in mobile shopping. Review function can be added to this mobile application which enables users to write their shopping experience for business owners to improve their services. This is a pioneering work for Malaysian literature, as there are limited studies that have explored issues concerning the use of QR codes in the mobile buying process.

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## INTRODUCTION

Mobile phones are widely used for dealing with our daily activities. A survey by Gartner in 2017 showed a significant increase on worldwide spending on devices for example desktop, tablets and mobile phones (Benjamin, 2018). The impact of the increase in mobile phone usage has led to the development of mobile applications. It is projected that the extent of mobile application development will also increase. Therefore, projects and studies on mobile application development also showed a significant increase in various areas. Among the projects are mobile development for games, teaching and learning and location tracker (Kamaruddin et

al.; 2011, W. A. Rahim et al., 2014; Juin et al., 2017 & Mokhsin et al., 2018).

Another report by Malaysian Communications and Multimedia Commission (MCMC) indicates the high number of users who use smartphones to shop online. It is also shown that online shopping has become one of the most popular activities besides social networking and engagement. Due to this, online banking and financial activities have increased 12.5% from 2016 to 2018 (Malaysian Communications and Multimedia Commission, 2018) with the increase in the adoption of

electronic and mobile wallet. One of the most popular mobile wallets in Malaysia is Touch 'n Go eWallet.

Mobile commerce refers to buying and selling items and services using wireless handsets such as smartphones and tablets. Mobile commerce helps users to access online shopping sites without having to use a desktop computer as an electronic commerce (e-commerce) tool (Kourouthanassis & Giaglis, 2012). Mobile commerce provides convenience to customers because it displays information about the product, clickable links on the item to know more about the product, and allows people to buy the product (Pappas et al., 2016). Previously if the customers wanted to buy something, they had to go to the shop or view the items in catalogues, but now with the availability of mobile commerce that uses just the Internet, customers are able to orders items without having to go to the shop (Kanga & Johnson, 2015).

The rest of the paper is organized as follows. The second section describes literature on mobile commerce with an overview of QR Code definition and comparison with the existing system. The third section is the methodology, followed by the results and findings. The conclusion of this study is presented in the last section.

## 2.0 LITERATURE REVIEW

With the growing usage of gadgets, the issues of technology readiness and adoption need to be addressed. Technological readiness is also important for consumers and businesses. This study is conducted based on an earlier research done by Janom et al., (2009), about the readiness of organizations to adopt new technology in e-commerce. Mobile commerce allows consumers to access and shop online without expecting to discover a place to connect to. Mobile commerce exchanges proceed to enhance and the expression incorporates the buy and sale of an extensive variety of products and services, online banking, bill payment, information delivery and so on (Nanehkaran, 2013; Tiwari, 2016).

With the consumers' move to 'mobile-first' now fully ongoing, researchers are constantly seeking to better understand consumers' mobile preferences, transforming their mobile operating models, strategies and processes, while responding to consumer demands for more personalised and contextually-relevant experiences, as well as instant access to products and services. When in shop, mobile shoppers tend to scan product barcodes and read reviews (Saprikis, et al., 2018).

Nowadays, people are using smartphones to do verifications and for this the QR codes are the most perfect approach to do it (Jathar et al., 2019). QR code usage in online purchases will be implemented in this module application. The use of QR code will make it convenient for consumers to purchase items online smoothly and fast as they only need to use their smartphones to complete the task. There are many benefits of QR code. The first benefit is QR code contains much more information than a regular barcode and can be used anywhere (Sigha & Verma, 2019; Gramigna, 2016; Goyal et al., 2016). The second benefit is, QR code technology is user friendly, and consumers do not need specific expertise to use this application, as QR code scanner only needs smartphones such as Android phones, iPhones etc (Sigha & Virma, 2019; Pons Chaigneau, et al., 2011). On top of that, QR codes deal with many advantages such as greater storage capacity, fast readability, 360-degree reading, small print size, error correction, support for more languages and durability against soil and damage. Many organisations which are comparatively new in online business platforms tend to expenditure these codes instead of normal login process (Jathar et al., 2019).

QR codes are easy to generate, can be personalised to fit promotional items, provide an easier way to manage the marketing presence's return on investment and allow active understanding of the interests of the customers. QR codes are software with small thresholds, small-cost, easy to implement and easy to use. It is a software that gives the buck a lot of bang when wisely applied (Gramigna, 2016). QR codes are implemented in purchasing such as on:

- the retail floors
- coupons
- receipts
- product labels
- tags

QR codes can easily be scanned through mediums like tablets, laptops and personal computer desktops. The system inevitably produces the Identification (ID) of the user and secured password. The characteristic which makes QR codes to be prominent is, they can still be scanned even if they are partially damaged (Jathar et al., 2019). QR codes software application allows users to record storage of address and URL of the products that the user might find interesting while walking, viewing advertising posts or reading magazines when using smartphones. This takes the image of that code and

allows the user to monitor the URL and product description by using the code reader software on the phone (Singha & Verma, 2016).

### 2.1. Comparison of E-Commerce Companies

This section discusses the comparison of commerce companies such as Tesco, HomePlus, Shoppe and Lazada.

#### a) Tesco Scan & Shop Malaysia

The mobile application is available on Android and iOS platform. Tesco Malaysia has launched a Scan & Shop feature which aims to make shopping easier. Tesco uses this method to save time for the checkout process. That the customer has scanned the QR Code is shown in nearly every corner of the store. The customer has to use the barcode to scan each product selected and click 'finish shopping' to get a new barcode to make payment at the counter.

#### b) HomePlus Virtual Store (South Korea)

The mobile application is available on Android and iOS platform. By using the app, HomePlus Virtual Store displays items that are almost the same as actual stores. Customers use the camera of the smartphone to scan the QR Code and automatically add the product to their online cart. If orders are made online, the items will be delivered to customers' door shortly after arriving home.

#### c) Shopee

The mobile application is available on Android and iOS platform. Shopee application is a platform for shopping. This mobile app enables the users to search for many sellers who sell the same product. Besides, the application also provides millions of reviews and the best deal of the prices based on user preferences. This mobile application allows users to select and delete the product for purchasing. To complete the task, the user has to obey the purchasing process.

#### d) Lazada

Lazada is a shopping platform. The mobile application is available on Android and iOS platform. This mobile app allows the user to browse for the sale of any item by many sellers. The platform also offers a number of ratings and the best price deal based on user preferences. The customer can pick and delete the item for

purchase with this mobile application. To complete the task, the purchasing process must be followed and the customer will receive order issued for 7 days.

### 2.2 Objectives of Study

The main aim of this study is to apply mobile commerce at Biz Corner Shop. This enhances mobile shopping experience since all the transactions can be completed via mobile phone. There are three objectives of this study. The first objective is to identify the requirements of Biz Corner e-Shopping apps. The second objective is to design the Biz Corner e-Shopping apps and lastly to develop the Biz Corner e-Shopping apps.

#### 2.2. Problem Statement

From the preliminary study, several problems have been identified. The problems identified were the inability of Biz Corner Shop to record and manage sales transactions, also poor management causing impacts such as supply-chain problems and loss of sales. The main problem was, Biz Corner Shop was using a logbook to record the sales of goods. Since this shop is handled by seven student clubs, it was very troublesome to track each sales transaction. There were also cases of missing or incomplete logbooks.

## 3.0 METHODOLOGY

This paper proposed a mobile application system that uses QR Code to help users buy items using cashless payments via their mobile phone. This app helps users to experience more seamless and pleasant shopping. This research applied design thinking methodology. Design thinking is a design methodology that provides a solution-based approach to solving problems. It is useful in tackling problems that are ill-defined or unknown, by understanding the human needs involved, by re-framing the problem in human-centric ways, by creating many ideas in brainstorming sessions, and by adopting a hands-on approach in prototyping and testing. Understanding the five phases of design thinking will empower users to apply the design thinking methods to solve problems that occur around them.

There are five phases of design thinking. Table 1 explains the five phases of design thinking methodology with brief description of the activities adapted in this study.

Table 1 Design Thinking Methodology

Phase	Description
Emphasize	In this phase, the problems to be solved were described and studied. The design features will help solve the problems. In this phase, we can get the problem statement, project objectives, scope and significance. In this phase, face-to-face interviews was conducted.
Define	In this phase, the information constructed during the Empathise phase was recorded. Define also can call observation, in this phase will be analysed and synthesized in order to define the core problem that have been identified. The problem statements should be human-centred manner.
Ideate	The needs of users were gathered in the Empathise phase, and experiences in the Define phase were evaluated and synthesized, and a human-centred problem statement has ended up. At the beginning of the Ideation process, it is necessary to get as many ideas or solutions as possible.
Prototype	The prototype phase is the process of converting all possible solutions into physical models in the ideate phase. Using functional prototyping, specific design features of e-Shopping via QR code mobile applications are created.
Testing	Testing is carried out to gain user feedback in the final prototype phase. Testing on five experienced users will be conducted in this phase to gain feedback on the mobile application. Their inputs will then be used to improve the mobile application until it is ready for market deployment.

This study was done at one of the Universiti Teknologi MARA kiosks in Selangor. The Biz Corner is handled by the Entrepreneurship Club of Faculty of Computer and Mathematical Sciences (FSKM). The shop was established in September 2019. This is one of the initiatives to develop entrepreneurial skills and to create intentions among students to become entrepreneurs as it can solve unemployment problems in many countries around the world and it is a strong element for sustainable and independent self-employment (Bakar, Ayub & Kamarudin, 2020). This is also in line with findings by Noor, Arshad & Kamaruzaman (2018) which suggested that universities should, among others, motivate students to become entrepreneurs by creating mentor-mentee program, and providing enough facilities for students and instructors. The Biz Corner is also managed by six other students' clubs such as Artificial Intelligence Society (AIS), Information System Engineering Club (ISEC), InStat, ITec, Netcentric computing, PRS and Math Club. This paper proposes a mobile application using QR-Code.

The objectives of this study are to identify user requirements, design and develop Biz Corner e-Shopping apps. This study also explores the application of QR-Code in various areas specifically on e-commerce.

The first objective is to determine the requirements of Biz Corner e-Shopping are achieved successfully. The requirements for this study are obtained from interviews and literature reviews. Face-to-face interviews were conducted with members of staff of the university, the President of the Biz Corner and students of the university. The findings were utilised to design the mobile application correspondingly to achieve the second objective of this study - which is to design the Biz Corner e-Shopping prototype. There are two types of designs in this study which are the conceptual design and detail design. The conceptual design provides overall view of the mobile application through the system's workflow diagram. Meanwhile, the detail design includes the storyboard as well as user interface design.

The third objective is to develop the Biz Corner e-Shopping prototype. The development of the mobile application comprises the functional and interactive design elements that have been interpreted during the development of this mobile application. To ensure that the development of mobile application runs smoothly, it is crucial to choose the appropriate hardware and software. The prototype from the development process was then used for testing with selected public users.

#### 4.0 FINDINGS

This section explains the findings of this study based on the objectives explained in the earlier section.

##### 4.1 Objective 1

The first objective is to identify the requirements of Biz Corner e-Shopping apps. To achieve the objective, literature review and face-to-face interviews were conducted. Literature reviews were obtained from relevant journals, article websites, and books that define the specifications of mobile commerce by using online library, Mendeley, Google Scholar etc. From here, design features, roles, and elements of the proposed mobile commerce were identified. An analysis and a review of similar or existing mobile applications is done to understand the functional and non-functional features that can be embedded in the E-Shopping via QR code application.



Face-to-face interviews were conducted with members of staff of the university, The President of the Biz Corner and students of the university. Based on the interviews, the purchase and sale process has been described as one of the most important activities at Biz Corner. It was also found that they wanted the purchasing process to be simpler for users. They also believed that using new technology will allow Biz Corner to attract more customers. They also agreed on the same problem that customers were not aware of the products being sold at Biz Corner and there was a need for an online space that provided these. The respondents also suggested that the store should be presented in a more interesting manner. Having a mobile application will be able to attract customers to purchase products sold at Biz Corner.

**4.2 Objective 2**

Objective 2 was aimed at designing Biz Corner e-Shopping prototype. A flowchart was constructed at the design phase to understand the process flow of Biz Corner e-Shopping application. Figure 1 shows the flowchart of Biz Corner e-Shopping.

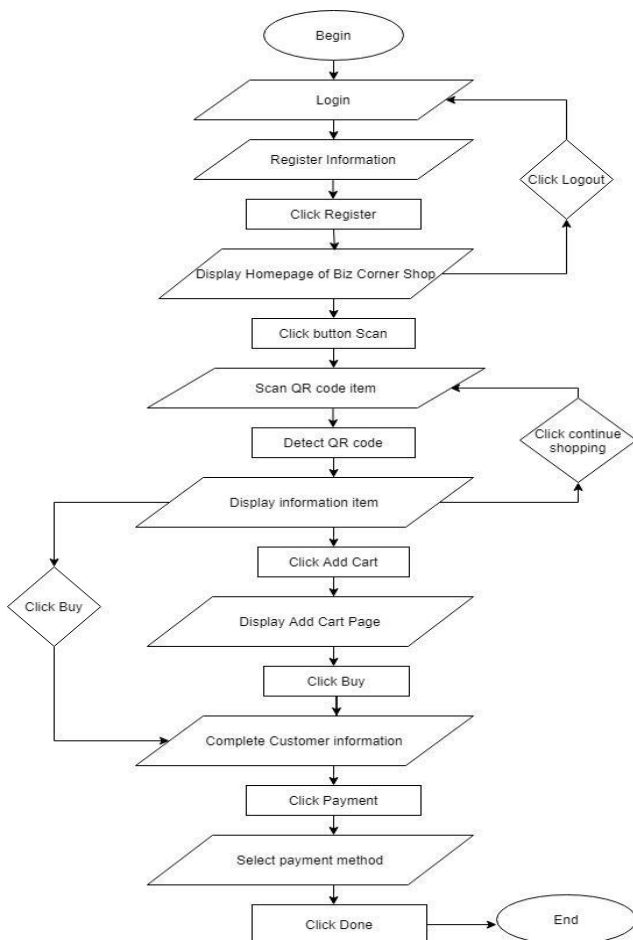


Figure 1: Flowchart of Biz Corner e-Shopping

Next, the low-fidelity technique was used to design the storyboard of Biz Corner e-Shopping. It is a representation of conceptual design that helps to validate Biz Corner e-Shopping during the design process. Figure 2 depicts the Main Page of the Biz Corner e-Shopping Apps.



Figure 2: Main Page

The main function of this app is to scan the QR Code of the product. When the QR code is detected, it will go to the next page which is to purchase items. It will display the items with detailed information including the price as shown in Figure 3.

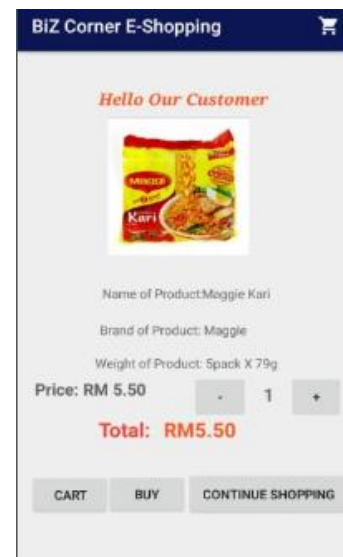


Figure 3: Detail Information

The customer will have a few options: the “CART” button, “BUY” button, “CONTINUE SHOPPING” button and “VIEW CART” button. After finalising the shopping, the customer will proceed to payment page. The customer will choose the payment method either Cash or Debit payment. When the transaction is completed and the payment of order is successful, the

customer will be directed to the homepage to logout as shown in Figure 4.



Figure 4: Logout Page

### 4.3 Objective 3

Objective 3 is achieved with the use of functional prototyping. Specific design features of e-Shopping via QR code mobile applications were created. The content of this mobile application was built through the use of Android Studio. The high-fidelity model was delivered

by mobile application of E-shopping via QR code. The prototype of Biz Corner was validated by testing the functionalities of Biz Corner E-Shopping among five selected public users. A series of tasks were outlined for the users before they started testing the mobile application. Most users agreed that it is easier to buy products from Biz Corner using the app. They also found that their shopping experience was more pleasant using the QR code technology of this app.

### 5.0 IMPLICATION

Although this mobile application can mostly help people to purchase items from using just their smartphone, there are some improvements that can be made on this application. It is recommended that the app should provide more selection of products to encourage users to purchase more items via this platform. Review function can be added to this mobile application to enable users to give feedback on their shopping experience so that business owners can improve their services.

### 6.0 SIGNIFICANCE

From the post implementation study with university community, it was found that several benefits have been gained after implementing Biz Corner e-Shopping app.

One of the advantages is the app enhances customers' purchasing experience. Customers were happy and excited experimenting the new technology. This gave significant benefits to sellers and customers. From the sellers' side, the sales increased. From customers' side, the Biz Corner e-Shopping app was able to attract more customers since the transactions were done via smartphone. It saves time and is hassle free. Moreover, the implementation of QR code has made the process of purchasing, recording and tracking at Biz Corner e-Shopping easier and efficient.

### 7.0 CONCLUSION

In conclusion, the new proposed technology by Biz Corner has effectively maximised customers' ease of purchase. Mobile shopping was proven to be able to reach more customers and increase sales. This study explored new shopping experience via mobile commerce. It enhances the process of buying and selling by integrating mobile application via QR Code. However, there were several challenges faced during the development process. This application only focused on QR Code method specifically for purchasing process. Moreover, only registered users are able to use the Biz Corner e-Shopping to purchase items. In future, this app

will provide more selection of products to encourage users to purchase via this platform. In addition, the review function can be added which would enable users to write their shopping experience using this app. With that, the business owners can use the feedbacks to improve their services and increase their sales.

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