FOOD HUB
A Model for Ordering In Restaurant Based On Qr Code Without Presence Of A Waiter At The Table

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Abstract: -- **Communication field has changed rapidly and an appropriate condition has been created to use this capacity in business due to developing technology in the field of information technology and availability of tools to work with this technology especially the arrival of smartphones to market and its expansion which provides the capability of connecting to the internet with desired broadband. In this article, we have tried to design a system to be able to provide more advantages including electronic payment of bills as well as entertainment facilities in the time between ordering and delivering the goods to customers beside previous options by reviewing restaurants that take advantage of the electronic menu using QR code on the customer's mobile. Moreover, in this new model, there will be the possibility of Internet-based remote ordering and also bill payment will be through bank portal before delivering the good to the customer by allocating QR code to the steady customers and entering their information in the databases such as phone number and exact address.**

Index Terms: - Smartphones, ordering, smart restaurants, QR Code.

I. INTRODUCTION

One of the main challenges in many businesses that are based on customer orders, product preparation and delivery to the customer is the time of order registry to delivery. Reducing this time will lead to customer satisfaction and consequently will improvebusiness. Currently, this cycle in our country is running traditionally in restaurants. This means that after the settlement of customer on the table, the waiter brings a list of products and gets back after a few minutes to receive the order. If the customer is undecided, the waiter has to come back after a specified time to receive the order (some restaurants put the customers' ordering on their own which is upsetting for them). After receiving the order and transferring it to the catering staff, the customer must be waiting according to the required time for order preparation. Order preparation time is very important in terms of management, because it is directly related to customer satisfaction. After preparation of order, the waiter takes it to the customer table. After the meal, the customer refers to the fund to pay the bill and ends the business cycle. Processing method of ordering in restaurant increases efficiency and reduces energy and time based on QR code without the need to the presence of waiter at the table by eliminating some stages of traditional ordering.

II. A REVIEW ON QR CODE TECHNOLOGY

QR code is not a new concept. QR code system was invented by Denso Company based in Japan in 1994. The main objective of this project was the permission for high speed scan [1]. QR code is a matrix barcode which is readable by smartphones and mobile camera. QR code is also often called with other names such as QR code and mobile code. Most purchased phones in America are along with a free software for reading QR code which is installed by default [2]. QR code can be used in trade-related activities including pre-orders, sales, and postal sales for transactions by mobile phones. For instance, a QR code can be used in commercials, coupons or promotional materials via taking picture and decoding by shared smartphones [3].

2.1. History

In 1970, IBM Company was able to change the input data into the computer automatically by developing UPC symbol which was consisted of 13 numerical characters. UPC codes are still widely used in Sale devices (POS). In 1974, Code 39 was developed which was able to encode about 30 alphanumeric characters. Then, in the late 1980s, signs of a multi-stage code was developed which was able to store about 100 character of type Code 16k and Code 49. Development process was so rapid in recent years so that the ability of storage was increased and other languages

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were included. Overall, QR code which is arose in 1994, can store 7000 characters [4]. Figure 1 indicates the evolution process of codes.
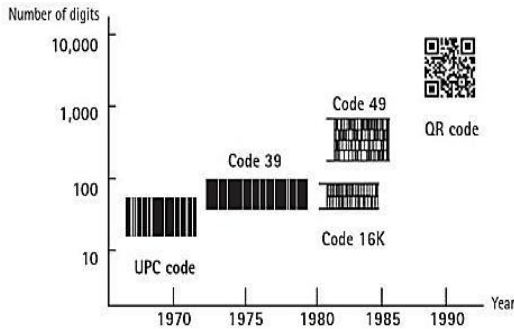

Figure 1. Process of barcode evolution [4]

2.1. Capacity and Troubleshooting in QRcode

QR code is consisted of several areas and there is a certain objective in each of areas. QR code is consisted of eight major parts; troubleshooting is one of its parts and figure 2 indicates its' precise location on thecode.
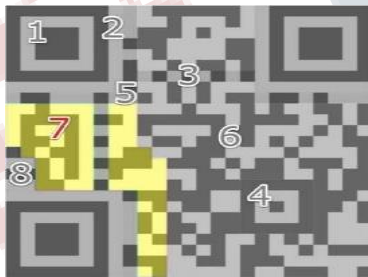

Figure 2. The precise location of troubleshooting in QR code (the zone number 7) [5]

The capacity of QR code is depended on several factors; one important factor is the code size. Troubleshooting level and type of encoding data also influence on the capacity [5].

• Version: there are 40 different versions of QR code which are created of differentmodules.

• Troubleshooting: it is based on Reed-Solomon codes in QR code [6]; it is a special form of BCH troubleshooting [7]. There are four levels of troubleshooting and user can select one of them when creating a code. Higher levels of troubleshooting reduce the error percentage but they increase the code words used for troubleshooting and as a result, they reduce the amount of data stored by the code[5].

III. QR CODE TECHNOLOGY APPLICATIONS

Usually QR code is indicated by a small white square with black geometric forms; this is while now colored squares and even marks are used for QR code. QR codes can store more information than conventional barcodes. Decoded information from a QR code can be a URL, phone number, SMS, electronic business card or a text. QR code is widely used due to its high speed access to information[2].

3.1. Case study of using QR code technology in restaurants in theworld

Some leading restaurants in developed countries have prepared the field of using QR code for customers' ordering. Many companies around the world are also established whose task is providing an appropriate situation for using this technology in restaurants and cafes. One of the studied samples is Menu-Craft Company (menucraft.ca) who provides the field of using electronic menus for restaurants. One of the customers of this company is a Japanese restaurant in Canada; it issues a code for each customer who comes into the restaurant. This barcode can only be used once in one time. The customer scans this barcode and links to the site www.menucraft.ca/snscaf/menu.php and can access to the menu of restaurant with picture and price and food ingredients. Figure 3 indicates the stages of ordering from the arrival time of customer to the system to finalize the order.

Figure 3. Stages of ordering in electronic menu of the studied restaurant

Customer reviews the menu and can order the products as much as he wants and then send his order. Here, there is another provision for the smartphones which are not equipped with QR code scan software. In a small sheet that includes specific QR code, a four-digit number is also mentioned for ordering without QR code. This way, customer can order by selecting the table which is sitting there and entering the four-digit code. It is notable that this four-digit code is single use and is reissued for each customer. Figure 4 indicates the overarching theme of ordering stages in this restaurant using QRcode.
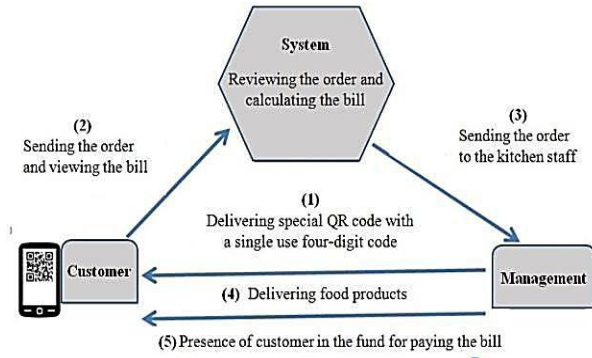
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Figure 4. Overarching theme of ordering plan in the restaurant using QR code.

Another example is the ABC Restaurant which uses both the services of Menu-Craft Company and a structure similar to the previous example except that there is possibility to see the bill after ordering.

3.2. QR code application inIran

Currently in Iran, private companies generally use QR codes only for advertisements and link on their websites or show phone numbers and addresses. Not only QR code is a separated symbol, but also it is along with the old form of advertising on billboards, business cards and paper ads; actually it is a ceremonial symbol, hence it is often unnoticed. One of the wide use of QR code in Iran was for SHABNAM labels. Outdated plan of SHABNAM was the incumbent government strategy in order to prevent smuggling. In this plan, each commodity (including imports and domestic production) received a label including a QR code and by scanning the unique identifier specified for that commodity was received. There was the possibility of tracking and querying by referring to the website barcode.shabnam.ir. This plan was completely abandoned by the passage of time and creation of counterfeitlabels. This technology can be very useful in commercial world. It has also many applications in health and education, but this technology never could find a worthy place in Iran. Perhaps the main reason is the asymmetry of time; when QR code technology was produced, there was no smartphone in Iran and when the smartphones were widespread in Iran, QR code was not a new technology in the world anymore and other technologies were replaced. Hence, QR code with many useful effects was neglected or used in primary stages.

IV. THE PROPOSAL FOR ORDERING IN A RESTAURANT USING QR CODETECHNOLOGY

The system used in some smart restaurants which allows customers to order by QR code using smartphones is limited to electronic view of menu and registering orders. But in the proposed model of this article which is based on the same QR code technology, more services are available for customers in addition to the previous options. In the proposed model, in addition to viewing the menu and ordering, the system calculates the prices and sends the bill to the customer's smartphone along with the connection link to the bank portal so that the customer can pay the bill electronically. However, the time between ordering and delivering is very important in terms of management. This system can provide interesting entertainments to customers during this period. Using this system is also very ideal for remote ordering. The error percent in food delivery at home would be zero if the database include the customers who orders food from home or workplace. This method can be used along with the traditional method of food ordering and delivering without any conflict with each other. There should be hardware and software condition to achieve this model; these infrastructures are asbelow:

* Softwareinfrastructure:
• Special designed system
• Database of the restaurant menu along with food ingredients, picture andprice
• Internal network or the internet in order to access to a bank portal and billpayment
*Hardware infrastructure:
• A smartphone equipped with QR code scannersoftware
• QR label specified for eachtable.

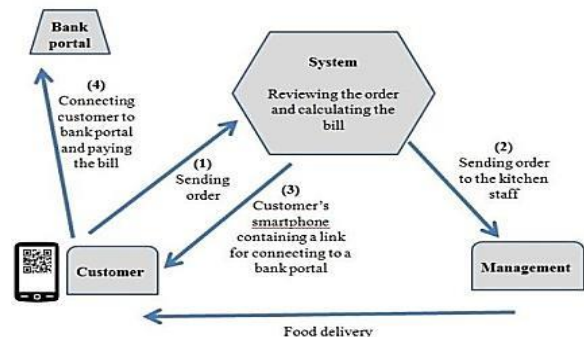Figure 5 indicates overarching theme of the proposed model stages for ordering in restaurant using QR code.

Figure 5. Overarching theme in proposed model of ordering in restaurant using QR code

4.1. Receiving order without the need to the presence ofwaiter

A special QR label is attached on each table. After settlement, the customer is connected to the special ordering system of this table directly by his smartphone and using the software of reading QR code. In this system, customer can see all available products along with price and descriptions of products. The customer chooses a desired food and enters his phone number and click on order registrationbottom. After receiving the complete order with the number of ordering table from the central system, a person who is responsible for the system, prepares the order and a waiter delivers the food to the customer traditionally.

4.2. Bill payment without the need to paper print and presence of customer in thefund

After ordering, in addition to process the order and report it to the kitchen for preparing the food product, the system calculates the costs and sends the description of ordered items along with price and total to the phone number of customer. In addition to the bill information, this SMS contains a link which the customer clicks on it and connects to the bank electronic portal directly. Customer can pay the bill via his smartphone, but this is optional and customer can pay the amount in the fund in cash.

4.3. Providing entertainment facilities in the time between food order anddelivery

Something that is very important in restaurants is the time between ordering and delivering to customers. If this time is more, customers are more dissatisfied. In traditional method, it has been tried to remove this shortage by providing magazines or board games. But it doesn't work all the time. There can be other interesting facilities on the customer's especial ordering page in ordering method based on QR code. For example, there can be some pictures of preparation stages of each product and some descriptions about it. The system can also have a box in which customers can put their opinions and statements and memorabilia; they can also read the writings of other customers who had sat on the same table before. In addition, this system can have a gallery page, customers can take picture from themselves or a picture from the table and food if they like and upload it on that page and also can see the pictures of previous customers of that table. Readings, images and interesting videos can be attractive for customers. Other entertainments such as simple games can also be put in this system by

which the customers can receive a gift like a drink if they win.

V. ADVANTAGES ANDCHALLENGES

Applying QR code technology in restaurants, the restaurant owners benefit of many advantages such as elimination of traditional ordering stage which is the main factor of the staffs wasting time. There are more descriptions on this menu than the paper menus along with pictures which cause customers to have a better and more favorable choice. The customer is not also under the pressure to issue an order and he can make his order with peace of mind. The other strength of this plan is to pay the bill electronically which prevents the pollution of money exchange. It has also a significant effect on protecting environment due to not use of paperbills. Another facility of electronic menu for restaurants is to delete or disable order click of a food if its row material is not available. A better and easier management of the store in busy times and avoid congestion at the checkout counter are other advantages of this model. This model prevents the ordering error which may occur by waiter or from the error of calculating the bill which may occur in traditional method. Another important advantage is to create database from the steady customers including address and phone number and allocate a QR code special for that customer and also remote ordering (home or work place) and sending the food the customer's address. One of the main challenges of this method is the loss of face to face relation of restaurant owner with customers. Face to face relation has an important role inattracting customers to the restaurant and intimacy which is virtually removed from this plan. Another challenge is designing a system and the need to an internal network or internet. Table 1 has compared the advantages and challenges of the proposed model briefly.

Advantages
1. Avoid wasting time ofstaffs
2. provide further information on electronicmenus
3. The customer is not under pressure of time for ordering
4. The benefits of electronicpayments
5. better and easier management ofrestaurant
6. avoid congestion on the counterpayment
7. Ability to reduce the work force, such as the removal ofcashier
8. prevent errors inbilling

Challenges:
1. Costs related to systemdesign
2. The loss of face to face relation with the customer
3. The need for the internal network or theInternet
4. supply the security Bankgateway

VI. CONCLUSION

By passage of time and popularity of the culture of using smartphones, the influence of this tool in all aspects was highlighted so that it has become an inseparable part of human life. The use of this capacity in the matters of business and directing users to the optimum and proper use of this tool is what customers and business owners are looking for. However, users tend to use technology in different situations more and more by increasing penetration of smartphones. A business can use this situation and benefit more that move before customers and prepare an appropriate condition in advance. Using QR code in ordering process causes to remove physical ordering and payment. In addition to more attraction, it provides more facilities to customers and business managers. This plan is not only to eliminate traditional ordering, but also to apply this smart ordering beside traditional method and attract customers and improve their sense of loyalty. Also, wasting time and energy of staffs will be reduced using this method and consequently customers are moresatisfied.

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