

**General Sir John Kotelawala Defence University**

Faculty of Engineering

Department of IT

Interactive Tablet Based Food Ordering and Order Processing Management System for Restaurants

Proposal of the Software Engineering Project undertaken in partial fulfillment of the requirements for the Bachelor of ICT Degree program

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# Introduction

The restaurant industry plays a very important role in the lives of individuals all over the world from both the consumption of meals and in providing employment for the individuals (Bachanan, 2011). According to National Restaurant Association (2013), it has been found that 65% of the adults think that the “restaurant” is a very general term in their life schedules. The National Restaurant Association (NRA), (2013) forecast, predicts that the restaurant industry sales are expected up to $683.4 billion in 2014. In addition, the NRA has estimated that 83 % of adults now prefer to take at least one of their regular meals at a restaurant in the perception getting a break from the regular life schedule and to be stress-free. As a result, the restaurant industry is experiencing fabulous evolution as more people prefer to consume meals outside of the office, home or school etc... Because of this social trend, restaurateurs are now looking forward to develop innovative restaurant concepts in order to satisfy the demands of customers.

According to Goch, (1999) the lifestyle of an individual can be directly affected by the strong growth of any of the existing industries that the people interact with, since the consumers are searching for services to complement their complex and busy life schedules. The competitive nature and the emergence of innovative concepts of handling the business processes, can be considered as another reason which contributed to the enhancement of restaurant industry (Bachanan, 2011). Due to these factors, the restaurant industry is always in a challenging position in capturing and holding the customers.

In order to conquest the challenge of capturing and holding the customers, the restaurants have to go through powerful marketing tactics, while maintaining competition among the rivalries in the industry (Kimes, 2008). As a result of that, the restaurant industry have taken the necessary measures to merge technology with the industry. Introducing technology for the industry makes diverse changes within the industry so that even altering the way restaurants engage in their business process (Huber, Hancer & George, 2010). Technology is becoming more important to the industry since it has help in conducting efficient business operations, producing more accurate products, and also helps in achieving better customer service/ experiences. As an overall study, the emergence of technology to the restaurant industry is beneficial in minimizing cost incurred in the business process, better management of employees and resources, improvement of the revenue and can gain competitive advantage as it is manageable to cater the customer preferences and modify menu items to meet customer s‘ perception and thoughts (Bachanan,2011).

# 2.0 Motivation for the Project

At present, one of the leading challenge for an businesses organization is that the reduction of operational costs and to increase the productivity (Pernebagayev,Singh,Sundarajan,2013). When focusing on business process efficiency with the minimization of the human‐related errors, might influence changes in costs and productivity positively in a greater level. When automating the procedure of food ordering system, it might result in faster process execution and also will reduce the errors caused due to human faults especially in the environments where information flows between the customer and the employee with multiple hops. Such an environment can be seen in restaurants where their intension to gain high level of customer satisfaction as well as to get reach the highest level of productivity in their services.

**?**

Weather they started preparing

It is too late…





Figure 1: Customer Dissatisfaction for not knowing the order status

Source: Author

In the normal context, customers go to restaurants for chatting, relaxing and to have food/drinks in a pleasant environment. Most frequently, when the restaurants are busy, people have to wait for hotel crew to come and to have the orders being proceeded. And sometimes waiters might be busy so that they might forget the orders, serve wrong order and also delivering after a long time. Due to this situation, customers might have to experience their orders which leads the customer to a state of dissatisfaction.



When will waiter come to take my order?



Figure 2: Customer have to wait till the waiter come to proceed the order

*Source: Author*





Figure 3: Customer dissatisfaction of providing wrong food items due to communication barriers

Source: Author

Since the human intermediation during this process is one of the key reason for altering the performances, introduction of an automated food ordering system might result in giving solutions. An automated solution can be assumed to have increase in the overall productivity in the process by decreasing the time and effort involved in the process and also facilitating the customer satisfaction. There are even instances where the customers are hard to be served due to language barriers. Therefore with the introduction of an automated system can act as a multi-language friendly order taking process which increases the customer satisfaction.

Present manual ordering system comprise of overheads in reprinting the menu even for the slide changes. But with the introducing concept of table top ordering by using the tablets evacuate the cost allocated for reprinting paper menus. Even the green globe concept requirement is also satisfied since paper usage become decreasing.

Usually waiters have to stay nearby to customer until they decide their food to be ordered. With the automated system implementation, either the waiter can be utilize for any other work to be done or the amount of waiters can be minimized since servers are not concerned in explaining each recipe, as customers have a quick view of how his/ her dish will look like.





Figure 4: Un-productive man power utilization

Source: Author

# 3.0 Application Proposal

As proposed solution for the prior mention anomalies in the traditional procedure of order taking process, an automated order taking and menu management system will be implemented in order to increase the entire ordering process productivity, minimizing cost incur in the restaurant business processes, resulting better management in employees and resources and increasing the sales.

## Restaurant Selection for the Implementation

Restaurant selection for the implementation process is very important since the particular restaurant must possess following criteria before get started with the requirement gathering.

The particular restaurant must have a seating area where a waiter can serve food/drinks on the table. But if the restaurant is engaging in the procedure of self-serving, the mobile applications aim of providing the better customer quality of experience cannot satisfied. Therefore the restaurants which possess the self-serving functionality was ruled out. Another important requirement is the category of customers where the restaurant is handling. The customers must have a likeliness to use these digital devices. The other most important requirement is the cooperation of the restaurant management to conduct the experiment with the new system. Their likeliness is much important in getting the requirements related with the development.

When considering the above criteria, Pizza Hut restaurant have been qualified from all the requirements. Then it has been decided to proceed with the requirement gathering through meetings which will be held throughout the duration of the project with the restaurant management and with the other project related parties.

## Functional Requirements

The functional requirements merged with the proposed system were identified as solutions for the operational issues identified. The requirements are categorized into four broad sections as shown in the logic diagram. Those are the customer, admin, chef and the cashier.

Database

Order Management System

Figure 5: Logical View of the proposed system

Source: Author

Cashier

Chef

Customer

Admin

* The Customer

The customer is the most important character in the proposed system of order management. Following use case diagram depicts the functional requirements related with the customer. The customer is given the functionality of selecting the native language (specific languages) in proceeding with the menu ordering. The digital menu will be displayed in the tablet and then customer can choose the food items. And also the customer can view the bill of the items being ordered. Once the order is confirmed, customer is given the opportunity to view the status of order preparation as for the particular food item as waiting to prepare, preparing and finished. If the customer want to cancel any item from the order, he she have the ability of cancelling the order before getting the notification of the status of “preparing”. Customer is also given the opportunity to order items again even though the order is confirmed. During this entire process, customer can ask for waiter if any help needed.

Figure 6: Customer Use Case Diagram

Source: Author

Customer

* The Admin

The admin role is important in managing and maintaining the proposed after deploying. The role of admin is the super user of the system since he can add, delete, edit, and update information regarding the changes in the system. Admin is given the authority of changing menu, food items and even the prices of them. Admin have the authority of handling user accounts created by cashier. And also he can view order processing status regards to any table. Even the structure of the restaurant can be updated on the system depending on the special occasions such as parties.

Figure 7: Admin Use case Diagram

Source: Author

Admin

<<extends>>

* The Cashier

The role of the cashier is to conduct transactions with the customer at the end of the dining process. The cashier have the ability to view the orders being taken by each and every table and also the status of the order on regards to the table. The cashier is responsible for managing the order and also to edit the order manually in case of table changing. Have the ability to confirm the total order to the system at the completion of the transaction.

Figure 8: Cashier Use Case Diagram

Source: Author

<<intend>>

Cashier

<<extends>>

* The Chef

The orders which has been confirmed by the customer is being currently updated at the touch screen available at the kitchen. Then the chef is have the ability to preparing the orders as per the queue. The chef have to confirm when he started preparing the food item and when he finishes so that the customer is updated via the notification. And also the chef have the ability to view the recipes needed in preparing meal.

Figure 9: Chef Use Case Diagram

Source: Author

Chef

## Non Functional Requirements

The non-functional requirements related to the proposed system as follows.

* Availability- If the system is deployed and used instead of the traditional paper based food ordering system, the entire business process is depend upon the system. Therefore the maximum availability should be maintained.
* Usability - According to one of the key objectives outlined in the project, the customers cannot be trained on the application usage. Therefore the interfaces belongs to the customer should be designed in way so that the customer experience the user friendliness in the interfaces.
* Security – The admin and the cashier should have their accounts in order to access the system. The WLAN security must be taken into consideration as anyone can access since the connection is wireless.

## 3.4 Technical Requirements

Technical requirement for the proposed system as follows.

* For the Android Application
* Android above 3.0
* Wi-fi enabled device
* For the system management module
* Windows XP/7/8
* Mycrosoft .net 4
* MySql

# 4.0 Aim of the Project

Aim of the project is to, **utilize the manpower efficiently in restaurants in order to reduce the operational cost and increase the productivity and at the same time to increase the customer quality of experience (QoE) by providing the digital menu card with attractive pictures and videos.**

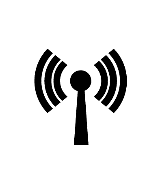
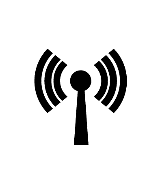
# 5.0 Objectives

In order achieve the aim of the project, following objectives is being identified. These objectives are considered as the mile stones in this master project of the development of an automated system to manage the orders in a restaurant.

* Critical evaluation of the traditional menu card system and identifying the drawbacks related the present situation.
* Identifying the actual requirements.
* Designing modules in a user friendly manner.
* Implementing data access points so that the information will be transmitted through the WLAN inside the restaurant enabling security and efficiency.
* Helping the restaurant crew to proceed with their business processes.

# 6.0 System Architecture







WLAN

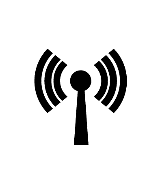
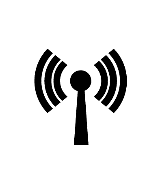
Table 1

Display Panel

Admin

Android Device 1 1





WLAN

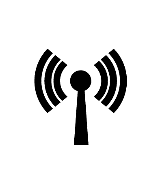
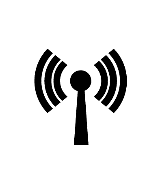


Display Panel

Table 2

Cashier

Android Device 2 1



Printer

Database Server



WLAN



Display Panel

Chef

Figure 10: Proposed System Architecture

Source: Author

Android Device 3 1

Table 3

When considering the overall architecture of the proposed system, it can be illustrated as in the above figure. It is proposed to work out the developed App in the android tablets which are provided fixed to the table where the customers can use it while on the table to order food. When the customer confirms his/her order the order details will be displayed on the display panel which is at the kitchen. Then the chef will start preparing the order. When he start the preparation, he has to mention that on the display panel. Therefore the customers now that the preparation has been started. At the end of the order management process customer will settle the bill paying at the cashier. The cashier will then confirms the total billing of that particular dinning at the particular table to the system.

# 7.0 Significance of the Project

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Replacing the paper menu with the digital menu and processing the order through wireless local area networked tablets and centralized server improves efficiency and accuracy of restaurants by reducing human errors and saving time and also it provides convenience for all the parties engaging in the ordering process.

* **Financial Viewpoint**

The cost incur in the waiters will be dramatically reduced for the restaurant as the customer can place the orders by himself with the provided tablet. And even the minor price changes, reprinting the cards also involves cost where it incur no cost in updating the menu card by the manager of the restaurant in the automated system. Appealing a larger target market can be done by customizing menu and information in their native languages, formats and tastes. The initial cost engaged with the system implementation will incur more cost but overall cost is being reduced due to the automation of food ordering process.

* **Technical Viewpoint**

Merging with the trend of using innovative technology with the passage of time is imperative to any industry in order to achieve success in their business processes. And even nowadays people are eyeing forward for an application which satisfies their needs even more simply. Most of the restaurants industries are looking forward for mobile application that enhances the dining experience. And also in automated order management system allows restaurant owners to communicate with customers in variety of media formats -slideshows, images etc. Therefore it is technically beneficial to merge technological innovations in order to up heal the prevailing business processes.

* **Social Viewpoint**

Reduction of time during the entire business process is considered as an advantage of using the automated system for order management. The efficiency which is created by the system makes both customers and the restaurant crew convenient by the means of satisfaction. The customer will be able to meet high quality of experience by reducing the time in waiting for waiters to place an order, waiting at the table till the order come even without knowing whether it is being preparing or not and even the quality images , descriptions about the meals is making the customer more helpful. The interaction between the customer and the restaurant is also becoming high with the system implementation through the live feedback through the system. All in all the system enhances the life style of the customer.

# 8.0 Research Approach

The approach of this research is to evaluate the use of interactive tablets for improve customer service over the traditional order management process in restaurants and to come up with the best solution to mitigate the existing problems in the current procedure of order management.

## 8.1 Research Design

The above mention research approach will be executed according to the dynamic system development life cycle on agile development methods as depicted in figure 11.

**Implementation**

Business

Review

User Approval and User guideline

User Training

Implementation

Review

Identifying Design Prototype

Agree

Schedule

Figure 11: Entire Project Summarization

*Source: Author*

**Design and Build Iteration**

**Functional Model Iteration**

Develop Functional Prototype

Review

Identifying Functional Prototype

Agree

Schedule

**Business Study**

**Feasibility Study**

Develop Design Prototype

## 8.2 Data Collection Protocol and strategy

Requirement gathering was conducted on the following strategies.

* Interviews, were selected in order to get the requirements from the hierarchy personal such as IT director of PizzaKraft Lanka (Pvt) Ltd since he is having busy schedule. Interviewing helps in discussing the issues related to overall development and solving those.
* Documentary review helps in getting the details regarding the structure of the database of the system to be.
* Observations are used to experience the current process of manual order processing and identifying the drawbacks in the current process.
* Questionnaires are helpful in getting the customers requirement on the system development.

## 8.3 Primary Data Spotlights and Actors

The primary data gathering location is the PizzaKraft Lanka (Pvt) Ltd, head office located at Union Place, Colombo. And the secondary data gathering spotlight was the internet.

* Client
* IT Director
* Staff members
* Stuarts including cashier and chef
* Stakeholders
* Customers

## 8.4 Data Analysis

Data gathered under the requirement gathering phase through the collection protocol strategies such as interviews, questionnaires, observations and documentary review will be accurately analyzed at the end of the requirement gathering process. Data gathered under quantitative data will be analyzed and presented via flow charts, graphs while qualitative data will be analyzed through self-decisions, pre-defined criteria, and experiences throughout the development process.

## 8.5 Ethical Overview

Information and all the other acquired data for the development of the system will be protected throughout the project and afterwards the implementation. And the requirement gathering process will be done under the correct guidance. Improper, invalid data will not be used as information of the entire project. Contribution given by the hierarchy , staff members, Stuarts including cashier and the chef of the PizzaKraft (Pvt) Ltd and the customers are truly accepted and guaranteed to assure all the facts as highly confidential as the system developer.

# 9.0 Project Scope and Constraints

The system implements following functions; customer will be able to view the menu , order the food, view the bill, view the status of food preparation and paying the bill at cashier, admin of the system have the authority to change menus, view all the table orders and current status of food preparation, handle user accounts, the cashier provided with the functionality of managing the orders, completing the customer transactions and finally the chef is given the functionality to view the orders and confirming item preparation starting and ending and also to view the recipes in preparation.

Apart from these functions, there are some limitations of the system like accepting types of payments such as credit cards, debit cards at the table itself without going to the cashier. More features can be added if the table could be reserved online before walk-in to the restaurant. And also it would be better if the customer will be tracked and enhancing the customer relationship management functionality through the system such as by giving offers to regular customers.

# 10.0 Project Plan

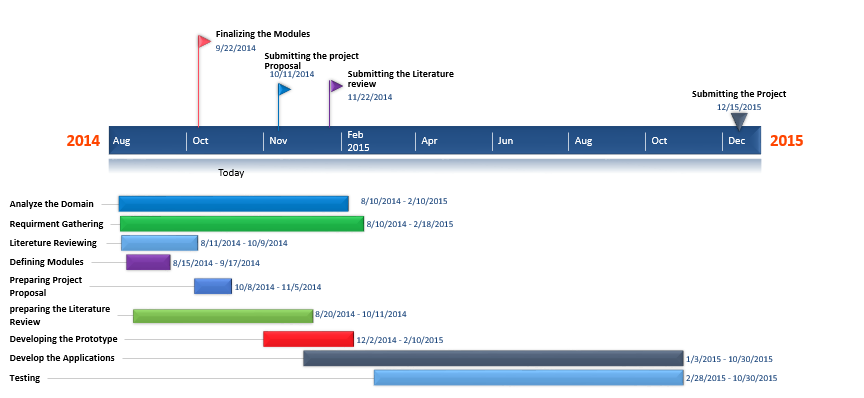


Figure 12: Time Plan of the Project

*Source: Author*

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