Improving The Ordering Service Through An Android Application

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Abstract - *In today's hectic world people are in a constant search to save time. In the service environment such as restaurants and bars people expect to have a fast and efficient service. But this is not the case in most establishments. This project tries to compensate for the slow ordering process and bring in an innovative and efficient system that will make the ordering process fun and fast. The developed system is an Android application that is meant to be placed in each of the establishment's tables so that customers are able to place orders through the system. Any retail establishment wishes to increase their efficiency, availability, and capacity and with the proposed system they will be able to accomplish that.*

Key Terms - *Efficiency, Ordering, Speed, Time Waiting*

INTRODUCTION

Service establishments such as restaurants and bars are on a daily basis trying to increase their number of sales. It is with the digital table top developed named *OrderMe* establishments will be able to accomplish their goals. With *OrderMe* customers will be able to place orders right from their table without having to wait for the waitress. This will eventually help increase the servicing speed, number of sales, and returning customers to the establishment.

The e-Commerce industry dates back to the 1960 where many companies in order to streamline business functions developed in-house computer systems and internal networks [10]. One great example of such business functions is processing customer's orders efficiently and quickly. The aim of the *OrderMe* system is just that, increasing an establishment performance and sales.

This paper will first explore various topics related to the servicing industry and the problems they face regarding efficiency. Then, it will move on to explaining the methodology of how the project was carried out and the different tools used throughout the development. It will then provide the results gathered from the development of the system. Finally, there is a discussion of the project and suggestions for further enhancement on the system and a conclusion.

RETAIL ESTABLISHMENT

A typical scenario when going to restaurant would be waiting to be seated by the hostess. Once seated the customer has to wait for a waitress to hand-out the menu. The waitress hands-out the menu to the customer and leaves to give them time to browse through the menu and take care of other tables in the meantime. Once the customer has decided on what to order he has to wait for the waitress to comeback to the table to take the order. It is at this stage where the waiting time could either be short or long depending on the demand at the restaurant.

The main goal of any service provider such as restaurants and bars is sales. But their success depends entirely on the number of orders customers make during their stay. During peak hours restaurants may opt to increase their number of waitresses but still not able to serve customers at an efficient manner. If customers experience a long waiting time for ordering and getting their food, they are less likely to visit the restaurant again.

Although waiting time does not directly affect the customer's loyalty to the establishment, there has been studies that suggests that it influences the service satisfaction, thus indirectly affecting the customer's loyalty [1, 3, 9, 14]. In order to positively affect the customer's satisfaction we must optimize the service delivery operations performance [13].

There has been studies such as the ones performed by Cronin & Morris and Innis & La Londe which reveals that satisfied customers are more likely to return to an establishment for repurchase, thus leading to more sales [4, 6]. Taylor establishes that a service delay will significantly influence the feeling of anger among customers, which may lead to an unsatisfied customer, hence affecting any possible purchases in the future [14].

Waiting Time

In the article written by Taylor she tries to define *wait for service* and states the following *"to understand the waiting experience, one must understand what is meant by wait for service. Here, it refers to the time from which a customer is ready to receive the service until the time the service commences"* [14]. The moment the customer enters the establishment the wait for service begins.

It is important to first understand the different aspects about time waiting and how it is perceived by individuals:

1. Physical (Objective) - This is the actual waiting time (the elapsed time it took to receive the service)
2. Mental (Subjective) - This is the waiting time that the customer estimates it takes to receive the service.
3. Cognitive - This represents the rationalization of the time waited, if it was acceptable, reasonable, tolerable, or intolerable.
4. Emotional (Affective) - This is the emotional response after the waiting time which could be happy, frustrated, and stressed.

While the customer is waiting he is constantly evaluating the cognitive and affective waiting time [9].

All of these aspects contribute to the satisfaction of the customer and determine if they will be likely to return. The customer's waiting time satisfaction will be determined by the gap between customer's perceptions and exceptions for the waiting period experienced [7].

Customer Expectations

When customers are paying for a particular service they have certain expectations to be met [11]. These expectations can vary depending on the service, but for the purpose of the project a restaurant establishment will be considered. A customer expects the service to be fast and polite, they also expect the food they ordered to be of their liking. When the customers expectations are met they are more likely to feel satisfied and content, whereas if they are not met they will be dissatisfied and less likely to return for their service.

In today's hectic world people have very little amount of time to waste. Davis & Heineke states that *"as the standard of living in the developed countries increases, the value of customers' time also increases, and consequently they seek out those goods and services which will minimize the expenditure of their time"* [5]. Consumers nowadays not only expect quality service but also expect it quickly.

Proposed Countermeasures

Whenever there is a situation in which demand is greater than capacity there will be a longer waiting time. Many organizations have found a way to make the waiting time more tolerable, thus making customers more patient [3, 15]. Some of these countermeasures are letting customers seat by the bar so they can order drinks while they wait or also giving them some complimentary appetizers such as garlic bread. But even with these countermeasures if the waiting time is too long customers will feel dissatisfied and angry which can lead to losing future sales and loyal customers.

A similar system to the one proposed in this paper that is currently available in the market is the *Ziosk* system. This system installs on tablets without any initial cost to the establishment, and it charges a monthly fee. But restaurants are able to recover this fee through ads and fee-based games within the application. This particular system also allows the customer to make the payment of their order when they decide to check-out. A franchise that has adopted this

system is Chili's which is currently operating in 124 locations with much success [8].

METHODOLOGY & DESIGN

The end goal of this project was to increase the efficiency and availability of the ordering process in retail establishments. This system was developed in the Android platform using different tools and methods. The system is mainly composed of three main aspects which are the database, the application, and the hardware.

Database

The data management is a very important aspect of this system, which is why a database was required. The database is a localized SQLite system within the application. Using Microsoft Visio an ERD of the database was designed in order to understand the relationship between each of the tables (Figure 1). Using this ERD the database was then designed within *Enterprise Architecture - Sparx* and the SQLite statements were compiled and then executed in *SQLite Manager* in Mozilla Firefox to create the database. The database is composed of nine tables:

1. Products - This table will contain all the data regarding the products in the menu. Most of the menu data was taken off from the Chili's Grill & Bar.
2. ProductImages - This table will contain all the images that are tied to a particular product.
3. Orders - This table will store overall information regarding the Order during a customer stay.
4. OrderProducts - This table will store information regarding each of the items ordered by the customer. Each of the OrderProducts is tied to an specific Order.
5. Categories - For this particular table is where the menu categories are stored. By design the menu will be shown in categories for better user experience.
6. Employees - This table will contain information about the employees of the establishment. Each tablet will be assigned to one employee.
7. Tables - This table will contain information about the table such as number of guests and number for future reference.
8. Promotions - This table will contain the promotional advertisement that will be used in the *OrderMe* system.
9. ReceiptTemplate - This table contains necessary information about the receipt print-out layout.

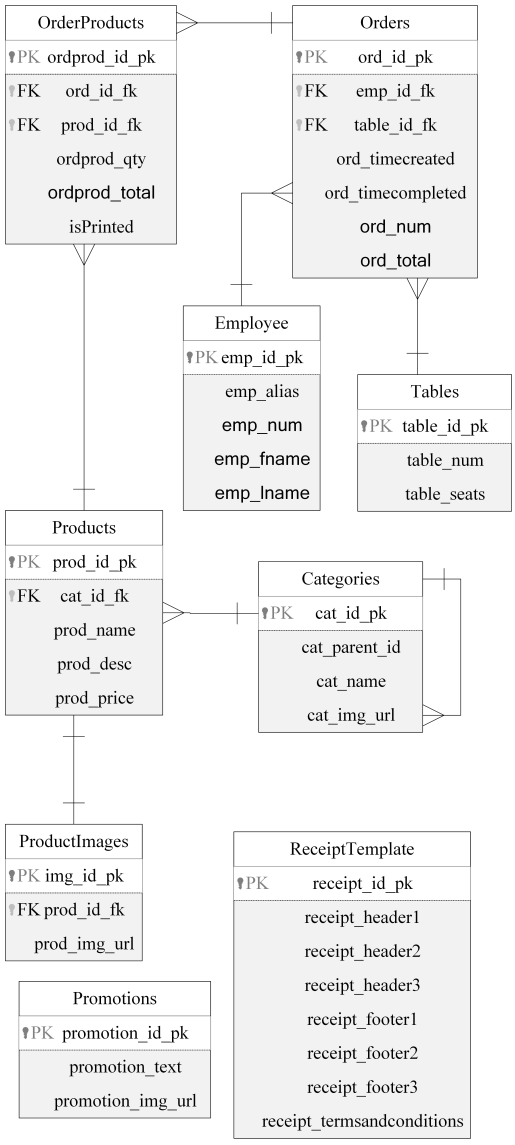


Figure 1
Database ERD

Application

The development of the application was done under the Eclipse IDE with the Android SDK plug-in provided by Google. The project was also placed under a revision control and source code management system. The revision control used was Git and it was setup to version locally. All of the graphic user interface was created in Photoshop CS5, while using the 9 patch utility tool provided by the Android SDK. The application represents the center of the system and ties everything else together. Figure 2 tries to portray the flow of how is the ordering process under the *OrderMe* system.

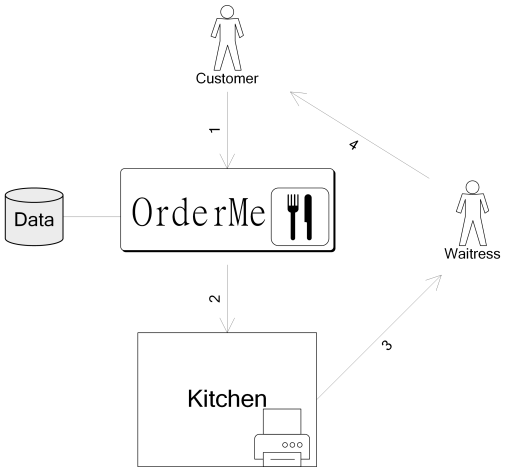


Figure 2
Ordering through *OrderMe* Flowgraph

1. Customer uses *OrderMe* system to look through menu and add items to be ordered.
2. Customer places order through the *OrderMe* system.
3. Waitress retrieves orders from kitchen.
4. Waitress delivers ordered items to the customer.

With the *OrderMe* system instead of placing the order to the waitress it is done through the application. The order is directly sent to the kitchen printer and immediately goes to processing. The waitress will then bring the order, once it is ready, to the customer. Customers are able to make many orders throughout their stay with this system.

Once the customer is ready to check-out, from the *OrderMe* system they will send a request to check-out and a receipt of their stay will be printed and brought in by the waitress to take the desired payment option.

Hardware

The system is meant to run on an Android Tablet of 10 inch screen with a minimum Android version of 4.0. In order to print the receipts the printer used must be a network printer from HP. The tablet must be connected to the same network as the printer in order to successfully be able to print the receipt.

The hardware used to develop and test the *OrderMe* system was a Samsung Galaxy Tab 3 10.1 (Wi-Fi)tablet with an Android version of 4.2.2. The printer used was an HP Envy Printer model 4500 with wireless connection set-up through a hot-spot from a Nexus 5 phone. The system was also tested while the printer was connected to a Linksys router.

RESULTS

Aside from placing an order the *OrderMe* system tries to exploit the advertisement and promotional campaigns. The *OrderMe* system allows restaurants to provide promotional advertisement within the application. This system makes the ordering process much more dynamic, fun, and interactive. The system is composed of four main views which are *Home, Menu, Order, and About*. Each of these main views are discussed in detail below.

Home

The “Home” section is the main view of the application. It is in this section where the promotions and advertisements were incorporated in the system. This section provides a list of images that auto-scroll every 10 seconds, giving the customers the chance to see the different promotions available in the establishment.

Figure 3 shows how the user is immediately welcomed at the home screen with the advertisements. This could easily provide the establishment with ex-

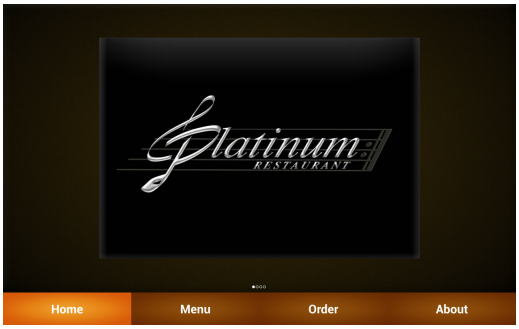


Figure 3
Home View

tra revenue since different participating companies such as *Heineken and Bacardi* can promote their products while paying a premium fee to appear on the *OrderMe* system. Many retailers and manufactures have come to rely on price promotions and offers in order to lure customers into stores and boost sales [12]. The *OrderMe* systems creates this opportunity for establishment to increase their revenue.

The class diagram for the "Home" view can be seen in Figure 4. This is a simple view which is contained within the fragment called *TabHome_FR*. The methods that contribute to the fragment are the *HomePager_Adapter* which handles the behavior of the *ViewPager* and the *Home_Loader* which is in charge of loading the data from the database. Note that the promotion may have text attached to it.

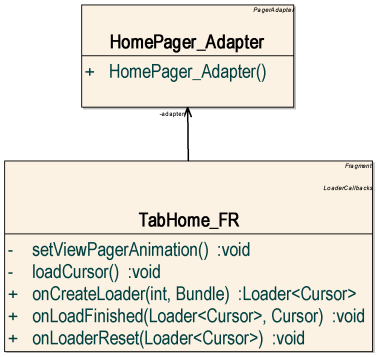
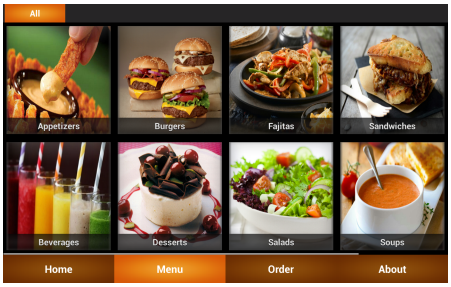


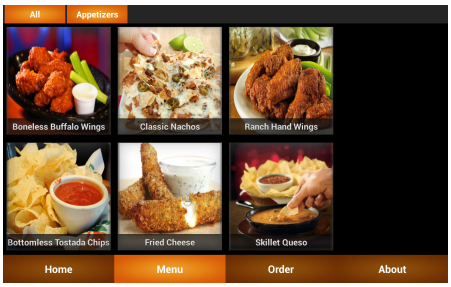
Figure 4
Class Diagram of "Home"

Menu

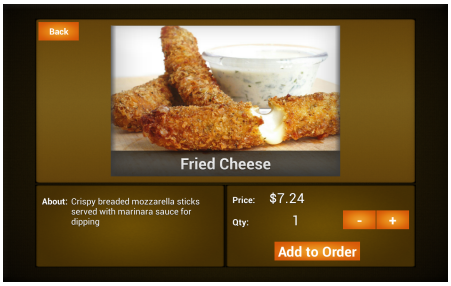
The "Menu" section is where customers will be able to view and add items to the order. The menu is shown as an image grid of categories and within each of the categories there can be products or subcategories. Once the customer selects a product a new view will be shown in which details about the product are shown and the customer may decide to add it to the order or simply go back to the menu.



(a) Categories



(b) Products



(c) Picker

Figure 5
Menu View

Figure 5 shows the work-flow of the menu and how easy it is to add new items to an order. The view shown on Figure 5c is where details about the product is shown. In this view there is information about the product and price. As mentioned earlier the menu may have subcategories. For example, in the "Beverages" category there can be a set of subcategories called "Beers" and "Sodas'. This provides a way to better distribute and organize the menu, thus making the interaction with the menu simple and easy to use for the customers.

The Figure 6 shows the class diagram of this particular view. The catalog is handled by the *TabMenu_FR* and once the user wishes to see detail about a product the *ProdPicker_FA* is executed. Once inside the *ProdPicker_FA* the user will either go back to *TabMenu_FR* or to the order view (*TabOrder_FR*). Other interfaces such as the *MenuCatGV_Adapter and MenuProdGV_Adapter* are in charge of handling the data of either the products or categories in the menu.

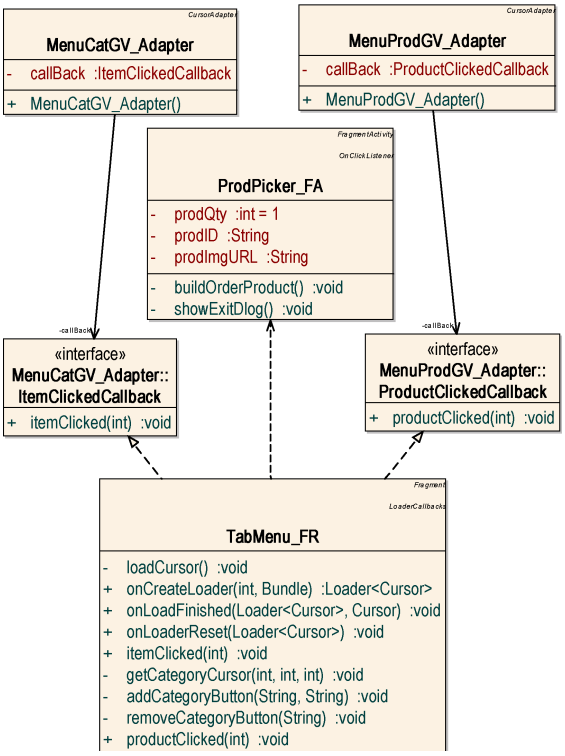
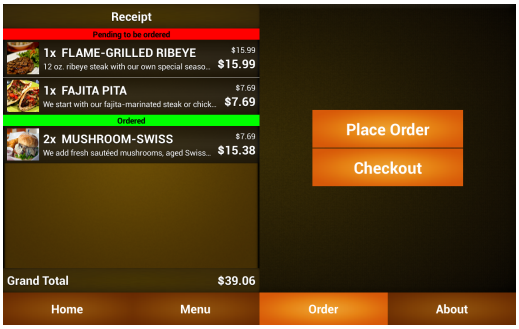


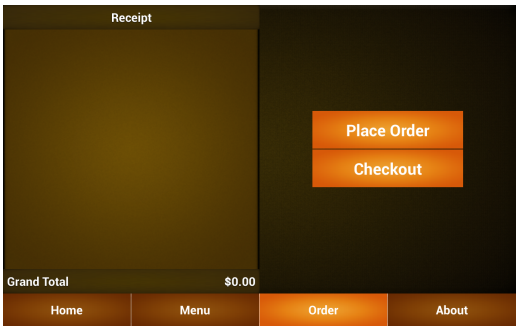
Figure 6
Class Diagram of "Menu"

Order

At this stage is where customers are able to place the order or checkout. The view provides a list of the ordered items to the left side and the possible actions (process order or checkout) to the right side see Figure 7. The list of ordered items are divided in two sections *Pending to be ordered* and *Ordered*. These sections are highlighted in red and green respectively. This was done so that customers are able to view what added items in the list have already being ordered and which ones were not.



(a) Order



(b) Order with Items

Figure 7
Order View

Whenever the customer decides to *Place Order* or *Checkout* a receipt will must be printed. With the *OrderMe* system the receipt is printed using a third party application called *HP ePrint*, which allows to connect to network HP printers and print. The *OrderMe* creates a text file of the receipt and stores it locally. The *HP ePrint* application is immediately launched with the location of the file attached to it. A connection with the network printed is established and the printing of the receipt begins, once completed it returns to the *OrderMe* system.

The ordering process through the system is easy and simple. In 8 the class diagram of this particular view is shown. The workload of the ordering process happens within the *TabOrder_FR* fragment. Methods like *placeOrder(), placeCheckout(), and printReceipt(String)* are the ones that handle most of the actions performed within this view. It is important to mention that there are other important classes like *Order* and *OrderProduct* that temporally handle the data of the order which is inserted in the database.

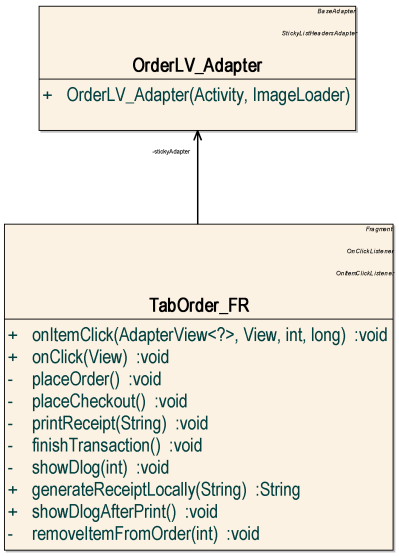


Figure 8
Class Diagram of "Order"

About

This last section gives the opportunity to the establishment to give some information about their business and commitment to the customers. It also provides a section where the establishment can provide the opening hours.

Settings

Like any software there needs to be a way for customization, the *OrderMe* system allows the establishment to change the table number and assigned clerk (waiter/waitress) to the tablet. In a real life environment a particular table may be assigned to a specific waiter. But throughout the day there may be different shifts, hence different waiters may be assigned to the same table at different times. This information is important because it is used for the print-out of the receipt and also to keep record about the order transaction. All the information within these settings are found in the database, specifically in the *Tables* and *Employees* table.

Entertainment

The *OrderMe* system improves the ordering process experience but it also helps countering the waiting time customers have to endure while waiting for their order to get to the table.

The system includes games and social media applications that can be used by the customers throughout their stay Some of the applications available are Candy Crush, Sudoku, Brisca, and Facebook. Thanks to this establishments will be able to offer customers exciting and fun entertainment right at their table, thus improving the experience of the customer (Figure 9).

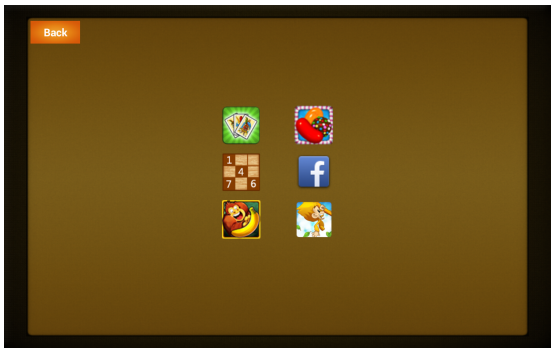


Figure 9
Games View

DISCUSSION

The *OrderMe* system has successfully made the ordering process of retail establishment much simpler and efficient. With this new system, customers no longer have the need to wait for a waitress to place an order. The establishment's performance will be positively affected by integrating such a system with their ordering process.

The system was designed to be user friendly and interactive. New customers will be able to adopt the system immediately and expect a more efficient service. Most of the system is based on images and very little number buttons, which makes the learning curve to be almost non existent.

With the introduction of this system to an order processing environment the responsibilities of the waiter/waitress will change. Since the order goes directly to the kitchen the waiter will only need to worry about bringing the order from the kitchen to the customer's table. The *OrderMe* system is in no way meant to replace waiter's job, instead it is meant to work along side them and make their work easier and efficient. The human workforce will always be

needed in service establishments because customers will still feel more comfortable if they have a direct interaction with other humans and not entirely with electronic devices.

A study done by the National Restaurant Association mentions that customers are craving for options in quick-service restaurants. The guests expect new options for how to place and pay for orders. More than 40% of all adults said that they would be likely to place their orders via restaurant's website, smartphone app, or in-store terminals [2].

Quick-service owners are currently investing a lot of money into changing and improving their ordering services. Close to 50% of limited service restaurants are planning on spending more resources on customer-facing technology such as iPads/Tablets and smart-phone applications [2]. This makes the *OrderMe* system a great potential system that restaurants may be willing to use.

The Table 1 shows the results of the National Household Survey of 2012 in which customers answered if they would be willing to use technology for ordering and payment purposes in quick-service restaurants. The survey shows that the idea of using such technology is very popular specially in the adults between the ages of 18 and 34. The data also shows that it is not very popular idea among the seniors, this could be due to the fact that they feel insecure and uncomfortable of using these type of systems. But as technology becomes widely available and adopted by more people the expectation of these types of systems will increase dramatically.

FUTURE WORK

This entire system is meant to be used as a proof of concept and can be used as a starting point for future expansion. Ideally an interface with accounting software such as Quickbooks and Peachtree should be developed.

This interface will integrate the *OrderMe* system with the accounting software used in the establishment. The data such as categories, products, and employees can directly be extracted from the accounting software, thus not forcing the establishment to re-enter the data at a different location to work with the *OrderMe* system.

Also this interface will allow the order transactions made in the *OrderMe* system to go directly into the accounting software for later usage. This gives the establishment immediate access to the ongoing sales.

Finally, the *OrderMe* system should eventually be able to process payments. This would make the experience much better, and customers would be able to checkout and immediately pay their bill at their table without having to wait for the waiter to bring the checkout receipt.

CONCLUSION

The main goal of the *OrderMe* system is to make the ordering process efficient and effective for retail establishments, yet convenient and troublesome for the customer. The system increased the availability, efficiency, and capability of the establishment by the means of the automation of processing orders.

Table 1
Using Technology in Quick service Restaurant

	Age Group					
	All Adults	18-34	35-44	45-54	55-64	65 or Older
Place Order using a self-service customer-activated ordering terminal	44%	61%	47%	45%	36%	19%
Place order online through a website	41%	62%	47%	37%	28%	15%
Smartphone application with features such as viewing menu and ordering takeout or delivery	40%	59%	42%	39%	30%	15%
Mobile or wireless payment options, such as Google Wallet or a smartphone app	27%	40%	29%	26%	17%	8%

Source: National Restaurant Association, National Household Survey, 2012.

There are three main operational elements that customers will use to measure its performance. Customers are always looking for speed, quality, and dependability. Each of these aspects will influence the customer's relationship with the establishment.

The *OrderMe* system tries to tackle, in a way, each of these aspects specifically in the ordering process. With this system the ordering process is fast, of high quality, and dependable. There is still a lot of work that can be done with the system but it serves as a starting point for more enhancements. The project was a great learning experience and exposed me to the different challenges customers face on a day to day basis with different service establishments such as restaurants and bars.

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