A Comparative Study on the Characteristics of Mobile Applications for the Restaurant Industry

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Abstract—**Mobile technologies are increasing being integrated in the food industry to provide customers and restaurants a good experience. This paper presents a survey of the state-of-the-art scientific literature available on mobile applications in the restaurant industry in terms of their functionality, designs, and user experience while considering both the user-end and back-end (restaurant management) interfaces. These applications have been divided in two main categories, i.e., dine-in and rider-based delivery applications. It has been identified that augmented reality (AR) and smart data analytics can play a major role in the context of these applications and thus their integration in the restaurant industry mobile applications has been advocated.**

Keywords—Mobile Applications, Restaurant's e-menu, user experience. iOS, Android.

I. INTRODUCTION

Food has always been an essential part of human life and thus the restaurant industry is one of the biggest industries all over the world. For example, there are over 1 Million restaurants in US with '5.6 Million employees and about USD 900 billions of estimated sales in 2020 [1]. In this paper, we describe the available mobile applications used in the restaurant industry and their user experience, with the intent to understand the main user requirements and thus further enhance the user experience and adapt to the needs of the customers. These mainstream applications (apps) in this sector include Foodpanda, Ubereats, Deliveroo, EatMubarak, and Cheetay for food delivery and eZeeiMenu, KabaQ, FineDine, and iMenuCard are the apps that are available for the digital menu. Some of these apps are integrated with point of sale (POS) system, which allows the owners to manage their sales and obtain feedback from the customers. Although these applications are making a lot of progress and adding a lot of value to the food industry, but there are still many enhancements that can be done at the application level. For example, the user interface plays an important role that can be significantly enhanced. One of the main motivations of conducting the study, presented in this paper, is to highlight the factors which we believe can play an important role in the success of mobile applications used in the restaurant industry.

The rest of the paepr is organized as follows: We have classified the existing apps in two main categories, i.e., "Dine-In" and "Delivery" and the next two sections describe the mainstream apps in these categories, respectively. This is followed by a discussion about the insights gained through this survey in Section IV. Finally, we conclude the paper in Section V.

II. DINE-IN APPLICATIONS

These applications are used for the diners who are within a restaurant and mainly use the app to order food. Tablets are either provided by the restaurant on every tablet or the diners can download the app on their smartphones to use them. All the menu of that restaurant is provided on the app and the users can select the food items from the app to place the order. These dine-in apps are usually integrated with POS systems which can help the restaurant owners to view the sale related information, get feedback from customers, improve food items and add more items to the food menu based on the customers demands. Examples of these apps are eZeeiMenu, KabaQ, FineDine, and iMenuCard, which have a decent number of downloads and reviews on the Google Play Store and Apple App Store.

A. eZee iMenu

eZee iMenu [3] is an innovative solution for restaurants that interactively presents the menu to its users. The digital menu offers several unique features that can be used to easily update the menu at any time. It also enhances the dining experience of the users using a simple and user-friendly interface that helps in navigation and browsing the menu [4]. This app can be integrated with the restaurant POS and supports both Android and iOS platforms. Some of the key features include theme customization, interactive meu, item modifier, POS integration, offline mode, guest feedback, order/item remarks, waiter/guest mode, sync, quick search, and export menu.

B. KabaQ

KabaQ [5], also known as QReal, is an augmented reality (AR) based digital menu application that is allows the diners to select the food by presenting virtual 3D views [6] of the food items on their table, in a restaurant while dining or ordering online. The app allows finding the location of a restaurant using a GPS tracker based on scanning images of food items served in that restaurant. So, in this way, users can also use this AR app to find the restaurant famous for a specific food item. Restaurants can subscribe to this service. A restaurant can buy their photoshoot set and take the 360 pictures of their food or they can hire a photographer for this work. This app is also available for both Android and iOS platforms. If the customers do not have smartphones then the restaurant owners can provide the pre-loaded tablets to their customers so that they can check and order the food. The restaurants can manage the menu items through the Kabaq admin panel.

C. Dyna-Menu

Dyna-menu [7] is a digital menu application for iOS and Android platforms. It provides two different packages: The first one, i.e., templates, allows the restaurant to select the layout and orientation from existing templates. The menu is highly customizable. Whereas the second, i.e., Bespoke, is a fully customizable digital menu. The restaurant can specify its requirements and Dyna-menu provides a customized solution for them. Once it is designed, the restaurant has full control over the menu and its staff can delete, edit, or add any item.

A comparison of the above-mentioned applications in terms of some key desirable items in dine-in applications is summarized in Table 1. It can be readily seen that the unique feature of Kabaq is its ability to showcase food items in 3D. Whereas, the distinguishing feature of eZee iMenu is the auto generation of bills, which is missing in the other two apps.

TABLE I: Dine-in Applications Comparison in terms of main Features

Features	eZee iMenu	KabaQ	Dyna-menu
E-Menu	√	√	√
3D Food	X	√	X
Analytics	√	√	√
Fully Customizable	√	√	√
Auto-Generated Billing	√	X	X
Social Media Sharing	√	√	√

D. FineDine

FineDine [8] provides a service menu platform and tablet/mobile application to help restaurants, cafe´, bars, and hotels in increasing their sales and helping to lower their operational costs. They have presence in more than 50 countries based on the following three products and solutions

- FineDine tablet menu
- FineDine mobile menu
- FineDine Kiosk

FineDine mobile menu is more focused on the user's side. This digital menu allows the user to share the menu with any mobile device without downloading an application. User must simply scan QR code with the camera to view the menu on the device. The restaurant can also share the URL with their customers on social media for delivery and pick-up options. FineDine also allows a customer to make payment for their order. They can pay via credit card or Apple pay before submitting the order. FineDine Kiosk allows a restaurant to display the entire menu with a picture and detailed description. Customers can easily select the items they want to order and submit their requests [4]. By using the recommendations, the restaurant can upsell and cross-sell directly on the menu for higher sales. The system keeps track of all sales and provides comprehensive performance overviews. The restaurant can check its daily/weekly sale statistics and can compare them. So, the app helps in finding out which items works best, and which do not.

III. DELIVERY APPLICATIONS

This category has three main components, i.e., "User", "Rider" and "Restaurant". The user orders the food from the given menu of a restaurant that is listed on the application. Rider is a person hired by the management of the food delivery app that delivers the food and thus uses a special version of the application to get navigation and details of the order [9]. Restaurant is the entity that provides the food items based on the order from the user. The whole process is as follows: A user opens the food delivery application and a list of all restaurants that provide online delivery are shown based on the user's location. The user selects his/her desired restaurant and a list of the food menu for that particular restaurant is shown on the app, from which the user selects a food item. The application sends the request to that restaurant and the restaurant starts to prepare the food. At the same time, the application sends a notification to the riders, who are available in that vicinity, that can deliver the food to the user. A chosen rider then picks the food and delivers it to the address of the user where he/she pays the amount and signs the receipt and the rider leaves. Once the whole process is completed the user can rate the food as well as the rider. Some of the most commonly delivery apps in terms of their downloads in Google Playstore, as depicted in Fig. 1, are described below:
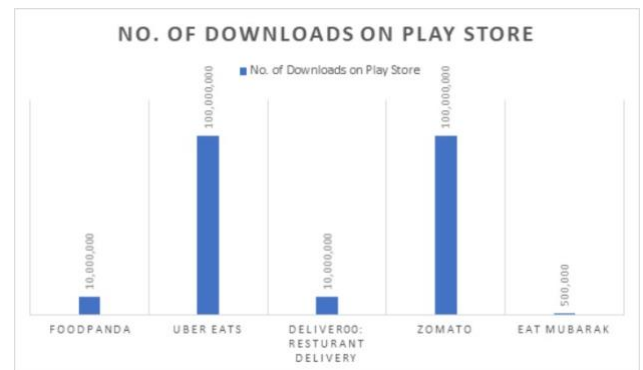

Fig. 1: Number of Downloads on Play Store for DeliveryApps

A. FoodPanda

FoodPanda [10] follows a discovery-based business model that acts as a middleman between the restaurants and their customer. It provides the logistic support to deliver the food and takes commission from the restaurant on each order. When a user opens the Foodpanda's app, the app shows the nearest open restaurants based on the user's location [11]. Once the food is added to the cart, the user can checkout and pay either by using a credit card or using the cash on delivery option. Once the payment is confirmed, the system notifies the restaurant about the order on their merchant application. Once the order is confirmed, the restaurant chefs start to prepare the food

for the customer. Meanwhile, as the order is ready, a notification will be broadcasted to nearby delivery partners (Riders) on their partner app. The one who accepts the request will be assigned to deliver the food on the desired location. The delivery partner then picks the food from the respective restaurant and takes it to the customer. Meanwhile, customers can track all the processes from the preparation of food to delivering food to their doorstep using the app. Some screenshots of the FoodPanda app are given in Fig. 2.
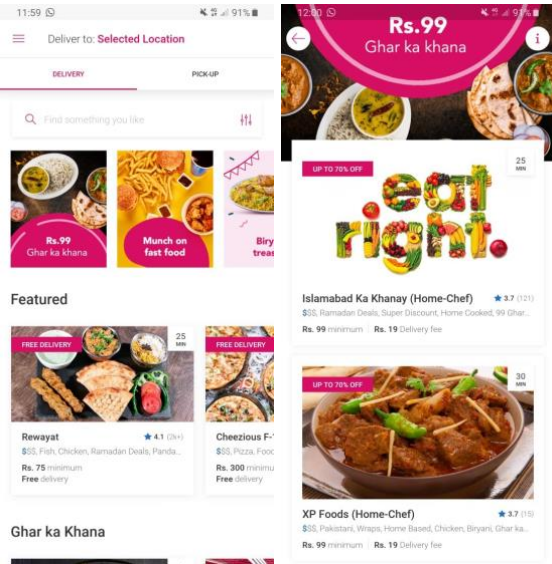

Fig. 2: FoodPanda Mobile App

B. UberEats

UberEats [12] follows a three-sided architecture, which is based on an on-demand food business model. It follows the same layout as the original Uber app that gained popularity in 2014. Some screenshots of the UberEats app are given in Fig. 3.
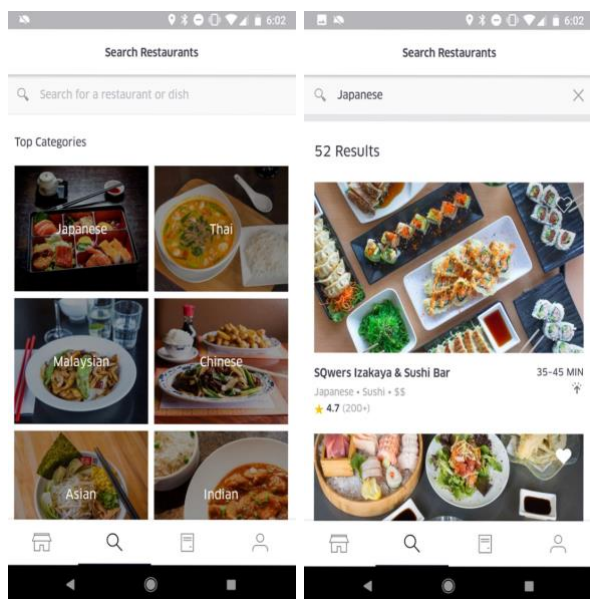

Fig. 3: UberEats Mobile App

In this three-sided market architecture, the customer places orders to restaurants through the central platform named UberEats and, in return, the restaurant partner pays a little commission to Uber and the driver (Delivery partner) gets its commission by delivering food on time to the customer. The user is presented with a user-interface that contains a list of partner restaurants. By clicking on a restaurant, the consumer is given the option to choose a dish that he/she wants to order from the selected restaurant. The driver picks up the food from the restaurant and delivers it to the user. All the payments are made through the app therefore no cash is required at the time of delivery.

C. Zomato

Zomato [13] is an on-demand food business model having operations in 23 countries around the globe. It is the biggest competitor of UberEats, having almost 100M+ download on Play Store. Its distinguishing feature lies in the way that it provides information about a particular restaurant, their menu card, average cost of a food item, average delivery time, rating, reviews, and providing a restaurant an ability to promote (Paid Promotion) their best dish to the user. The app uses GPS coordinates of the user location and shows the nearest restaurants. The user places the order based on the list of food available and the restaurant receives and prepares it. Then, a rider delivers the food on the doorstep [11]. Once an order is completed the customer can rate a restaurant based the quality of the food, look, and feel of their ambiance, and their experience. Some screenshots of the Zomato app are given in Fig. 4.
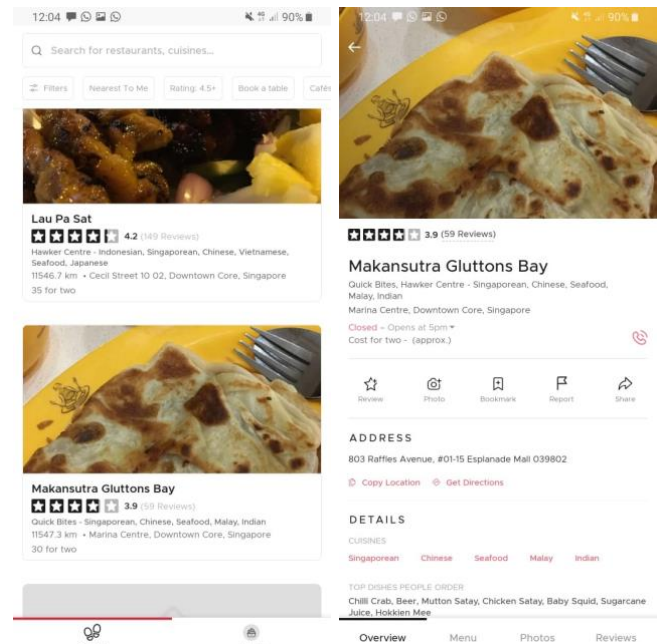

Fig. 4: Zomato Mobile App

A comparison of the three above-mentioned apps in terms of the key features, namely availability of digital menu, third party delivery, average item cost, average delivery time, and tracking is presented in Table II. It can be readily seen that Zomato provides the most comprehensive set up of features, whereas the other two apps, i.e., FoodPanda and UberEats, are quite comparable with one another.

TABLE II: Delivery Applications Comparison in terms ofmain Features

Features	FoodPanda	Uber Eats	Zomato
Digital Menu	√	√	√
Third-Party Delivery	√	√	√
Avg. Item's Cost	X	X	√
Avg. Delivery Time	√	√	√
Tracking	√	√	√

IV. DISCUSSION

Both modes of business, i.e., dine-in and delivery, are essential for any restaurant to thrive. The above-mentioned mobile applications fill the gap with the help of technology. Customers want convenience in all aspects of their lives, including food. They want to enjoy meal during a busy day at work, in evenings with friends or family. Customers are increasingly looking for the applications that allow them to order from their existing location and for a fast delivery of food. Most of the successful delivery apps have minimal or no delivery fee and they aim to deliver as quick as possible. To make this service better they remember previous orders, track the order, rate driver, and expand loyalty programs. Due to this convenience, digital ordering and delivery has become more efficient than dine-in.

Augmented Reality (AR) [6] can be quite useful in the context of restaurant industry. It is the modern way to attract the customers. It is being utilized by some apps to display food but there is so much more that can be done with AR than just displaying food. With the potential of AR, we can show the customer in detail what they are eating in terms of the ingredients and calories. Moreover. It can be used to promote discounts, happy hours, and specials in a more interactive way that keeps the user engaged with the restaurant. To engage the customers, restaurant can display videos, like chef interviews, other customers review and cooking videos. AR is also a great way to overcome languages barriers so these food apps can be customized for many other languages.

Based on this study, it has also been noticed that, in general, there is a lack of digital customer feedback and analytics system, which allows the restaurant to gather data on customer menu engagement and trends, in most of the existing apps. Similarly, there is no proper way of receiving feedback from the dining customers at the level of individual dishes. Generally, paper-based feedback forms are collected, or some generic online websites usually collect feedback for the restaurants. The lack of resources to collect dish specific feedback limits the restaurants to improve upon their menus and also does not provide any guidance to new customers to choose a dish based on the experiences of past customers. We also noticed that the data collected from the user is not being utilized in the most effective way in the existing apps. This data can be meaningful in many ways like getting to know the most favorite dish of a restaurant, providing data analytics to users about the likings of the users with similar demographics etc.

V. CONCLUSIONS

The mobile applications are adding great value to every aspect of life and thus can have a big impact on the restaurant industry as well. In this paper, we surveyed the main mobile applications used in the restaurant industry by categorizing them in the dine-in and rider-based applications. The paper also describes the key features of these apps and presents a comparison between them. Based on our survey, augmented reality (AR) and data analytic can play a major role in revolutionizing the restaurant industry but there are not many apps available that leverage upon the full potential of these technologies. We believe that these features can play a vital role in fulfilling the gap between the restaurants and the users and thus can lead to huge financial benefits considering the volume of the restaurant industry.

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