AP~Diet: An Online Healthy Food System for Higher Education Institution

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Abstract. With emerging technologies, online food ordering and delivery services are growing at a rapid pace due to advancement in technologies and changing customer behavior. Consumer’s response to the Internet has developed opportunities for many businesses, ranging from small to large corporations in Malaysia. Online banking has given businesses opportunities to expand their online services including online food ordering and delivery services. Online food ordering meets the needs of busy individuals with a hectic and bustling lifestyle by placing their order online through their smartphones, tablets or laptops and receive delivery within a few minutes to their doorsteps. However, there is a lack of platform offering healthy food and especially for those following a specific diet. With busy schedules, most students find themselves ordering junk food online or cannot find the proper meals online according to their specific diet. This research paper proposes an online healthy food ordering and delivery system called AP~Diet for Higher Education Institution to provide students and staffs with healthy food options according to different diets. Extreme programming methodology will be used to develop the online ordering and delivery system. The findings indicated that the proposed system is an effective initiative to promote healthy lifestyles and proper eating habits for students and staffs of Higher Education Institution using the enhanced web service.

1. Introduction

With the advanced in technology, e-commerce is spreading at a rapid pace around the world which includes the food industry. The demand of food ordering and delivery applications have seen an exponential growth owing to the convenience and ease of use. Today, food ordering applications come with prominent friendly features, together with the incorporation of popular payment gateways and real time GPS tracking, that makes the lives of people around the world much easier simply by going through their smart gadgets, placing orders online through few clicks hence minimizing human error instead of the traditional way of placing orders over the phone [1]. Through online ordering, customers take their time to browse menu without the need to worry about long queues behind them or even help them avoiding long queues to prevent wasting their time. Online food e-commerce is expanding considerably due to several factors comprising access to technology and changing in consumer habits as highlighted in [2].
In this fast-developing era, more and more people are gradually being forced into a hectic and bustling lifestyle which concludes that they are rarely willing to invest more time in the preparation of homemade food and eating healthily. This applies especially to university students who most of their time have assignments, exams, revisions, presentations, tutorials and other activities in which most of their time and energy are invested in. Consequently, they find it hard to spare some time to prepare food and prefer to eat outside. According to a study done from a sample of 1719 Malaysian adults, 51% of them agreed that they are barely able to take into consideration healthy eating and diets due to lack of time and busy schedule [3]. Another similar study was carried out among 35 university students stating that students would rather spend time on other activities rather than cooking, particularly when it comes to cooking for themselves [4].

This project being proposed is about an online healthy food ordering and delivery system called AP–Diet for Higher Education Institution whereby students and staffs will have the opportunity to order healthy food items according to different diet categories around the nearby region of Kuala Lumpur. Different meal plans will be available on the system according to different categories of diet which include keto-diet, vegetarian, vegan, weight-loss and diabetes. For the payment, users will be able to choose between paying with their debit/credit cards and cash on delivery payment facility. This web application will also allow users to track their order status through GPS tracking, as well as, fast delivery facilities and low delivery charges will be taken into consideration. APDiet aims to ensure that students and staffs of APU are provided with healthy food according to their diet being followed and do not face any difficulties in the search or even in the preparation of their diet meal plans.

2. Online Food Ordering and Delivery System.
An online ordering and delivery system provide customers with a way to place an order at a restaurant via the Internet and the items will be delivered to the customers at their respective doorstep. As mentioned in [5], online food ordering and delivery services are usually websites or mobile applications of local restaurants and food cooperatives set up for customers to choose from interactive menus to make the ordering process to occur. Similarly, to ordering consumer goods online, online food ordering and delivery services also enable customers to register and maintain their account for convenience to frequent ordering processes. Article [6], highlighted that restaurants can offer online ordering through their own websites or apps, through a multi-restaurant website or app (aggregator), by text or through Facebook or other social media platforms. According to a study carries out by Market Research Future, the online food ordering market is likely to increase by 16% each year to touch USD 17.02 billion in India itself by the year 2023 [7]

According to [8], the earliest on-demand food applications were designed to connect customers to restaurants to place an order from their online application whereby the restaurants would fulfill the orders and make use of their own fleet of delivery staffs to deliver the items. Skip The Dishes was an early pioneer in the development of on-demand food ordering in Alberta. The author also mentioned that the second wave of applications developed a change in which the restaurants would not coordinate all the ordering and delivery process but instead, the delivery companies will manage the delivery of the food, as well as, the online food ordering and delivery platform. This approach permits the restaurant to emphasize on the preparation of food rather than the logistical complexity. For instance, GrabFood and UberEATS are part of this approach [8]. The latest on-demand food ordering and delivery platforms are endeavoring to embrace all three components which are ordering, cooking and delivery. These operations are performed by the restaurants handling all the tasks from obtaining orders from their own online application, to preparing the food in their own kitchens, to delivering the food to their customers with their own fleet of delivery personnel [8]. As a matter of fact, this type of approach allows a company to gain full control of the food ordering and delivery service process which ensures that company standards are met through all these three stages [8].
Currently, electronic ordering is possible from restaurants, via both their own websites or apps and multi-restaurant websites. Several factors have to be taken into consideration in order for restaurants to have their own online platforms which involve possessing ordering capabilities and linking the electronic order to their own Point of Sale (POS) system as directly as possible. Researchers in [7] reported that the development costs of propriety system can be very costly, but it will be helpful once the system is launched in order to support online ordering. These systems can also support Facebook ordering and text ordering. The different traditional types of online ordering and delivery food system include multi-restaurant sites, Facebook ordering and text ordering.

As new online platforms are rapidly taking over within the business of delivery food products to the doorstep to capture markets and customers across the United States, Asia, Europe and Middle East, the traditional business way of dining in restaurants is taking a new turn. Undoubtedly, the most common form of food delivery is the traditional model whereby the customers place orders with their local restaurants and wait for their food to be delivered to the door. While this traditional way of food delivery takes up 90% market share, most of these orders are still placed over phone calls. With the rise of technological advancement, customers are more comfortable to ordering online through websites and applications due to convenience and transparency. There are two types of food ordering and delivery online platforms dominating the food industry on the Internet which are aggregators and new delivery players. In [9] researchers argued that both of these online platforms enable the comparison of menus, reviewing and scanning posts and placing orders from a wide range of restaurants with a single click.

Aggregators are based on the traditional model for food delivery which provides access to multiple restaurants through a single online platform. Users are able to log in to the website or app to compare menus, prices and reviews from other customers. The aggregators collect a fixed amount of the order which is paid by the restaurant and the latter is liable for the actual delivery. No additional cost is given to the customer. According to [10], the two aggregators which achieved global scale are FoodPanda and Delivery Hero, where both drew $110 million in new investment in 2015. In contrast, new-delivery players also allows customers to compare offerings and place orders from a variety of restaurants through a single website or app but in this case, the new-delivery players build their own logistics networks and delivery is provided for restaurants that do not have their own delivery personnel. This result into opening the market share to higher-end restaurants that provide home delivery. Hence, food delivery companies make profit up to 30% regardless of the rising costs of transportation and maintenance [10].

3. The Impact of e-commerce on food ordering and delivery system.
In this new era, with the emerging growth of e-commerce, a large number of industries around the globe have embraced this facility including the food industry. From a business perspective, e-commerce is a method to retail and sell goods and services to consumers through the Internet. The amount of online food delivery sales reached up to $4 billion mark in 2015 [10]. Likewise, in [11] researcher claimed that 33% of consumers were making use of online platform for food delivery and reservation on a daily basis. Due to technological advances, people’s preferences are switching towards a more digital and more organic approach to their food choices. According to [12] the retail e-commerce revenue is believed to rise up to $15.25 billion by 2012. Adding on, there are numerous factors, including access to technology and changing consumer habits, the online food business is growing drastically as highlighted in [2]. For food retailers and manufacturers, this growing market offers a large opportunity. Nevertheless, the author stated that this changing industry might be hard to navigate for some. As a matter of fact, it was also found that food industry will expand at a faster rate as more services like food delivery, grocery delivery, ready-made meal kits or food ordering and delivery applications evolve [2]. Therefore, it is crucial that food companies engaging into the food e-
commerce take into account the country regulations, labelling requirements, consumer trends and
other factors that can influence their business.

The following Figure 1 depicts the revenue in US Dollar for e-commerce within the food industry
[12]. The figure clearly illustrates that the retail e-commerce revenue is expected to rise up to 15.25
billion U.S dollars by the year 2021 from the sales of food and beverages, therefore indicating the
growth of e-commerce within the food industry in the future to be well-boomed.

![Figure 1: The impact of e-commerce in the food industry [12]](image)

Due to advanced technologies, people preferences are leaning towards their dependence on technology
whereby they prefer to make all their transactions online including getting cooked meals delivered to
their doorstep. Furthermore, the creation of online banking has been advantageous for many online
businesses including food ordering services.

4. Research Methodology

For this research, extreme programming methodology will be used as the system development
methodology for the implementation of the AP–Diet web application. The reasons for opting XP
methodology instead of other methodologies is due to the fact that XP aims in the delivery of high-
quality software within a short time period, and also, it is able to adapt to fast-changing requirements
which makes XP a highly adaptive development approach. Utilizing extreme programming as the
system development methodology of a project will allow iterative and frequent small releases
throughout the project, which enable both the team members and customers to analyze and review the
progress of the project throughout the system development life cycle [13].

![Figure 2: Extreme Programming Methodology](image)

The first phase of extreme programming methodology involves setting the goals and objectives of the
project and certain iterative cycles. In this phase, the team will meet the customers and extract the
requirements for the system. This will be done using questionnaire as the form of data collection
method for the proposed system due to the simplicity required for its design and, it is easy to
understand. Online questionnaire was designed and distributed among the students and staffs of
Higher Education Institution in terms of Google Form and the results obtained from the respondents
for further analysis, the questionnaire comprises of 20 questions which were divided into two sub-sections. The first section was based on the respondent’s demographic information while the second section displayed questions related to online food ordering and delivery services. Customers will describe the functionality of the system in terms of user stories which do not need to be overly technical, only enough detail is required to determine the schedule of the project. Following that, the team will create a release schedule and divide the project into iterations, together with a Gantt chart to share the schedule of the project to the team members. For the AP–Diet web application, the first step in the planning stage will include setting up the goals of the proposed system and collecting information from the users. The project will be divided into iterations and a Gantt chart will be created to determine the schedule of the proposed project.

In the second phase, the developer will analyze the data gathered from the users and point out the relevant issues that may arise during the development of the AP–Diet project. The requirements from the end-users will be taken into consideration in order to make proper adjustments and decisions for the implementation of the required features and functionalities expected from users. In the third phase, one of the main principle of XP approach will be considered which is simplicity and based on this principle, the researcher will start working on the simplest design without the functionality since it is less time-consuming than the complex solution. The developer of the system will design and will be responsible for coding for the design [14].

Phase four involves the coding of the web application. In this stage, codes will also be reviewed, functionalities and features will be added and edited, bugs will be fixed, as well as, refactoring codes will take place. The refactor process enables simplification of codes without affecting the functionality of the final product [14]. During the coding process, it is necessary for the customer to be available in order to verify the requirements.

The final phase requires conducting unit testing alongside code writing, driven by small release of iterations, all the small releases need to be tested thoroughly prior to release. XP is driven by unit testing and user acceptance testing. Unit testing will be performed on every coding achieved to eliminate and fix bugs. Upon completion of the unit testing, user acceptance testing was conducted to ensure the functionality of AP–Diet is in line with the requirements of the target users.

5. Results and Discussion

In phase one of the research, feedbacks from a total of 41 respondents comprising of students and staffs of Higher Education Institution were obtained. The results gathered show positive feedback from most the respondents, supporting the fact that such web applications benefit the user in the future. From the results, the majority of the respondents have experienced online food ordering through either web application or mobile applications. Even though 12.2% do not typically order food online, they have order food through other mediums such as phone ordering. Based on the findings, a total of 47% of the respondents make use of online ordering and delivery services once or twice a week while 32% of the respondents confirms that they make use of these services on a daily basis. Hence, implementing this project will be beneficial to these group of respondents especially if they are on a specific diet plan which can be acquired under a single platform rather than surfing on different websites. The following question reinforces that the majority of the respondents opt for online delivery services since they are convenient and is not time-consuming unlike the process of preparing food. Eighty percent (80%) of the participants spend around RM10 – RM50 on ordering food online giving rise to business opportunities with delivery platforms.
The data acquired through the questionnaire also demonstrates that the quality of food is considered as the important factor when ordering food online compared to price, delivery charges, speed of delivery and location. In conclusion, as long as the food quality meet the expectations of the customers, other factors are not that dominant for online food ordering. Moreover, most of the respondents believe that dieting is important. On the whole, the majority of the respondents felt that there is a need to design a web application that will provide them with the necessary diets in order to improve the quality of healthy eating habits.

6. Conclusions
Throughout the results and discussion, it can be foreseen that due to change in customer behavior and advancement in technologies, delivery services have step-forward with an overload of technical features that facilitate the task of ordering online. The current delivery services are more flexible and reliable. The proposed AP–Diet is a healthy food ordering and delivery system for Higher Education Institution with target audience comprising of students and staffs, which will provide them with different diet options such as ketogenic diet, diabetic diet, weight loss diet, vegetarian and vegan diet. However, the research can be further enhanced by including the muscle-gain diet plan as this has been gaining wide popularity among the young generation.

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