eCarte: An Interactive Restaurant Menu with Feedback Collection

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Abstract

The restaurant industry has grown over the years along with the modernization of technology. Like any other area of this industry, the menu presentation also demands improvement. Possessing smartphones proved to be a necessity nowadays and regular restaurant customers with their phones bring an opportunity to materialize the concept. The idea of accessing the restaurant menu through smartphones is new to a restaurant in Oriental Mindoro, Philippines. Hence, the proponents were motivated to develop the eCarte – an interactive restaurant menu with feedback collection. The development of this system can improve the customer's experience which would be beneficial to the restaurant. Proponents used incremental development as a software development method to come up with an efficient system. The developed system is user-friendly and interactive. The customers will be able to see the actual picture of the dish with a short description, and other customers' reviews. Selected Information Technology Faculty, restaurant owners and customers evaluated the system. The five evaluation criteria used were adapted from ISO 25010 software quality standards. Based on the evaluation result, eCarte is usable and met its expected functions in terms of functional suitability (4.93), performance efficiency (4.88), usability (4.84), security (4.83), and maintainability (4.84). The system is generic, not expensive, easy to maintain and suitable to any smartphone regardless of its operating system which makes it applicable to any local restaurant. For further improvement, the proponent recommends applying an algorithm like the High Adjective Count algorithm and Max Opinion Score algorithm to effectively analyze the customer's feedback.

Keywords: customer feedback, Oriental Mindoro, restaurant, restaurant menu

1. Introduction

The restaurant industry is one of the fastest-growing industries in the world, given that people of all ages undeniably love to eat. In fact, there is a saying

that goes: "Food is life." There are many restaurants everywhere that offer different cuisines to fit the various taste of customers. Aside from the variety of cuisines, excellent services with the help of emerging technologies are another highlight. Service innovation on customer experience increases customer satisfaction significantly (Su, 2011). Restaurant owners get ahead of their competitors with the use of technology. Restaurants that used technology in any way in their operations are more successful than those who did not (Huber *et al.*, 2010). There are many technologies available to improve the diner's experience, and one of the most common is Point-of-Sale System (POS). However, other areas have also a potential to be improved, like the menu presentation (Tauli, 2012). To make it possible, the use of mobile technology is highly essential (Sharp, 2017).

Nowadays, having smartphones are common to all customers, and it is more convenient if the menu of their favorite restaurants is accessible on it. Although many restaurants in cities already use an electronic restaurant menu, it is still relatively new for local restaurants in Oriental Mindoro, Philippines. Most of the local restaurants in the province still use the book of menus or just a list of offered dishes that is given to every customer when ordering. According to TripAdvisor (n.d.), there are 128 local restaurants in the province. Some of these restaurant are wanting to improve their menu presentation and ordering system. This is the main reason why the proponents were motivated to develop an interactive restaurant menu with a feedback collection named eCarte. The main objective of the study was to design and develop an interactive restaurant menu with feedback collection for local restaurants of Oriental Mindoro.

The proposed system has a great advantage because it can display additional information about the dishes compared to just a list of the menu. The system provides a very interactive user interface where necessary details about the food are available. It could also serve as an ordering system where the customer can pick and click to order. Furthermore, the customers could also see the comments of other customers about the foods and services of the restaurant. Not only do customers benefit from the proposed system, restaurant owners likewise gain because of its feedback collection feature.

Customers' feedback helps the restaurant in their marketing strategies. They can easily determine what to maintain and what to improve in their services (Kipfelsberger, 2016). Commonly, the restaurants gather feedback through distributed comments cards, word of mouth, and sometimes social media

posts. These mentioned feedback collection techniques have many shortcomings. For example, in the comments card, the restaurants use a bulk of paper and sometimes, the in-charge has difficulty reading comments due to bad handwriting. Also, a lot of feedback from word of mouth and social media posts are time-consuming to gather. With the help of the developed system, the customer can rate and write reviews easily and do not need to use pen and paper.

The developed system has an existing similar application. However, such can be accessed only through an internet connection, and is expensive to implement and unsuitable for any platform (Bharadi *et al*., 2013; Pieskä *et al*., 2013; Hartwell *et al*., 2016). Meanwhile, there is a free existing application that is generic, ready to use and downloadable through the online mobile application store. However, this available application is not preferred by the local restaurants for some reasons such as annoying advertisement, unavailability of technical support and a possible threat related to data privacy (Khatoon and Corcoran, 2017; Hassan *et al*., 2018; Suresh *et al*., 2019).

The developed system can operate even without an internet connection; as a result, there is no need to provide expensive networking devices, and it is easy to maintain. Moreover, the system has no abrasive advertisements and is developed according to local restaurants' needs. Also, it will not compromise any personal data of the restaurants and their customers.

2. Methodology

2.1 Software Development Method

Proponents used a generic process model called incremental development. This software development method is based on the idea of developing an initial implementation, exposing this to user comments, and evolving it through several versions until an adequate system has been developed (Sommerville, 2011). This method was used because it allowed developers to identify and analyze all the requirements during system development. Since the system was being used by the local restaurants, defining user requirements could not be done in just one meeting. It required collaboration not only within the development team but also with the target users, who helped point out significant features. Using this method, the proponents already expected

possible changes; thus, the code structures were designed to be modifiable. Although the method is a trial and error development, it could lead to a more efficient system (Szalvay, 2004).
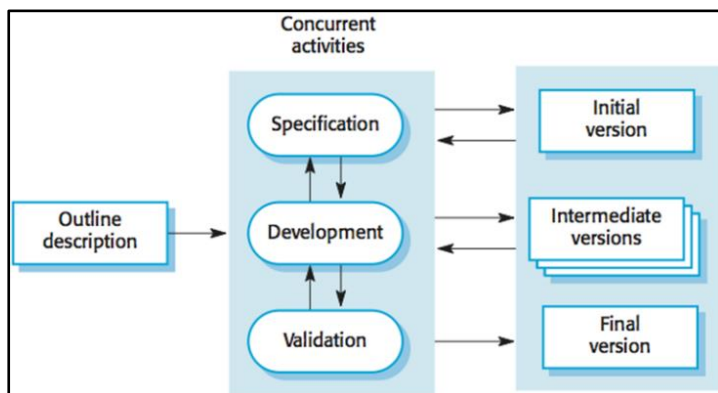

Figure 1. Incremental development model (Sommerville, 2011)

The software development involved three phases, which were performed concurrently during the development of each version (Figure 1). The development of the initial version was the most significant because it served as the foundation. In the specification phase, the proponents conducted an ocular visit and informal survey to some local restaurants located at the municipalities of Bansud and Bongabong, Oriental Mindoro. Results indicated that restaurant owners were willing to adopt the proposed technology. The suggestions of restaurant owners and some customers helped to create a simple system architecture (Figure 2).
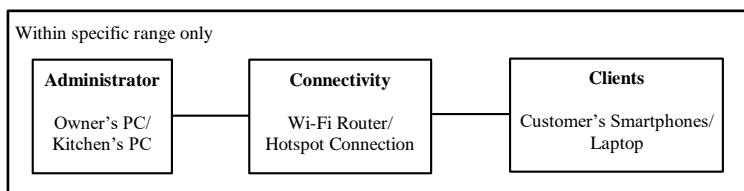
Figure 2. System architecture

Most of the target restaurants' location has a weak internet connection; so they come up with a system that will operate even without internet. They also identified the android and IOS as a common operating system (OS) of the customer's phone. Hence, the proponents made the web-based system to enable viewing in any OS using a web browser. Thru the use of a Wi-Fi router,

the system could be accessible in any smartphone (Android, IOS, and Windows) or even laptops through its browser within the given range. The users merely have to connect on the wireless connection provided by the restaurant.

The proponents identified what programming language, localhost server, and other necessary software were essential for developing an efficient system. Common user requirements were determined, such as being user-friendly, customizable, and having the ability to serve as an ordering system. In the development activity, the proponents used scripting languages like HTML 5, PHP 7, and Javascript; while WordPress was also used to make the coding easier. Furthermore, XAMPP was used as a web server solution package, which consists of Apache HTTP server, MariaDB database, and interpreters for PHP scripting language. After developing the initial version, it was validated by the restaurant owners. During the first validation, the owners identified issues like customer log-in, misspelling, and display error. In the developed initial version, the customer was required to provide some personal information. However, according to restaurants owners, it was time consuming and could compromise customer identity. Instead of providing personal information, there was an option to provide or use an alias or pseudonym before ordering. Also, additional features are identified such as order cancellations, adding food details related to allergies, and report enhancement.

In the specification phase for version 2, all comments and suggestions of restaurant owners who validated the initial version were considered. Internet articles and review of related studies also helped to specify some additional requirements needed in the enhancement of the initial version. The actual enhancement of the initial version was done in the development phase. The proponents modified the design according to the result of the first validation and added new modules for additional features. For report enhancement, the proponents modified their database design. After the development, another validation was done, leading to the identification of design issue.

In the development of the final version, the proponents skipped the specification phase because all requirements were already specified. In the development phase, the proponents enhanced the user interface design and fixed some browser display incompatibility. The system was then ready for final validation through the system evaluation survey.

2.2 Testing and Evaluation

To make the system more functional and bug free, the proponents conducted an alpha testing. This kind of testing makes the software system more refined

before its deployment. Information Technology instructors of the College performed alpha testing. After some design issue and functionality were fixed, the system was ready for evaluation.

The proponents identified 50 respondents using purposive sampling to ensure that the evaluators could provide a more reliable evaluation result. The respondents consisted of Information Technology faculty, restaurant owners, managers, crew, and customers. They used the system several times, tried all the features, and checked its functionality.

The evaluation questionnaire utilized was adapted from ISO 25010 software quality standards. These criteria evaluated were functional suitability, performance efficiency, usability, security, and maintainability (Table 1). Other criteria were excluded because they were irrelevant to the developed system. The proponents devised indicators for each criterion, which was validated by the Research Director and other researchers of Mindoro State College of Agriculture and Technology (MinSCAT).

Table 1. Components of evaluation questionnaire

Criteria	Indicator
Functional Suitability	The system runs according to its expected functions.
	The system works correctly based on user requirements
	The system provides features that enhance the ordering process and related transactions of restaurants
Performance Efficiency	The eCarte updated restaurant and customer information in real-time
	The eCarte load quickly even transactions done simultaneously
	The eCarte can handle a large amount of necessary data
Usability	The eCarte is user-friendly
	The user interface of eCarte has a pleasing and satisfying interaction for the user
	The eCarte met the needs of the Restaurant and its customers
Security	The eCarte does not compromise the personal information of the user.
	The eCarte provides a mechanism to prevent unauthorized access to data stored on the system.
Maintainability	The eCarte can also apply to any restaurant.
	The eCarte is easy to modify without causing any errors on the other components of the system.
	The eCarte provides some mechanism to know if there is an error in some parts of the system.

The proponents used five-point Likert scale with the mean range interpretation of (1) 1 to 1.80: poor, (2) 1.81 to 2.60: Fair, (3) 2.61 to 3.40: Good, (4) 3.41 to 4.20: Very Good, (5) 4.21 to 5.00: Excellent.

3. Results and Discussion

It was observed that some customers were unfamiliar with some dishes offered by the restaurant; and it became inconvenient if the waiter had to present a list in their menus. This resulted to the common scenario where the customer would ask the waiter about some food details, which was very time-consuming. According to thefork (2018), restaurant crews received a lot of questions from customers about the details of their orders, particularly if the customer was health-conscious or has a health condition such as an allergy. These information were unavailable in the traditional menu presentation. Common problems in the restaurant industry were easily solved through the use of modern technology. The development of an interactive restaurant menu offers many benefits for both customers and the restaurant owner. This kind of technology integrates both concepts of intranet and wireless technology (Khairunnisa *et al*. 2009).

3.1 System Interface

The system called eCarte provides two user interfaces, such as the administrator page and the customer page. The administrator page was designed for viewing on desktop or laptop computers while the customer page was applicable in the smartphone's browser.

The developed system is very flexible, where the restaurant administrator can fully alter the contents and settings of the system. The administrator can reset the color, logo (Figure 3), the restaurant's basic information (Figure 4), and add some audiovisual presentation (AVP) about the restaurant (Figure 5) and preview customer's page (Figure 6).
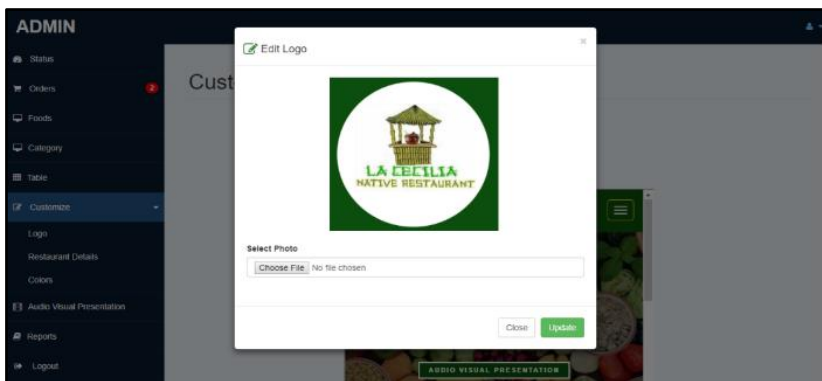
Figure 3. Changing logo
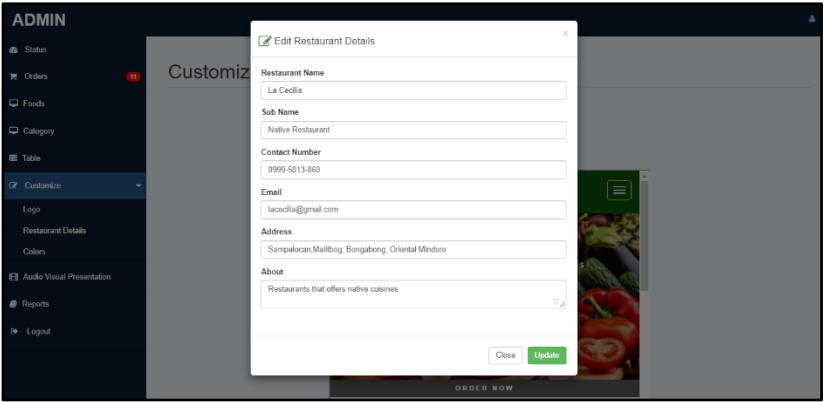
Figure 4. Altering restaurant details
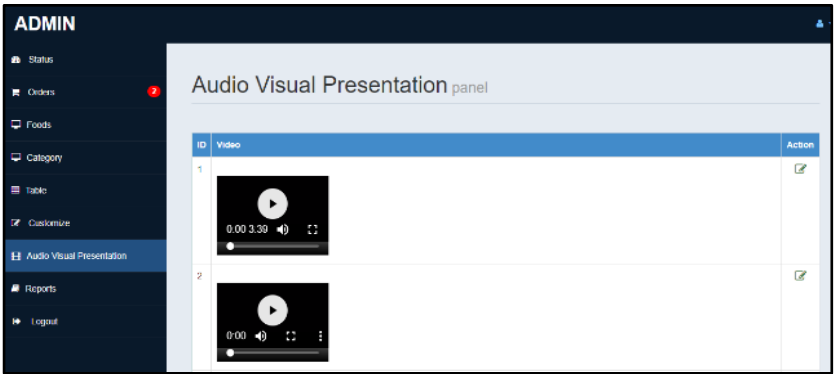
Figure 5. Adding or changing AVP
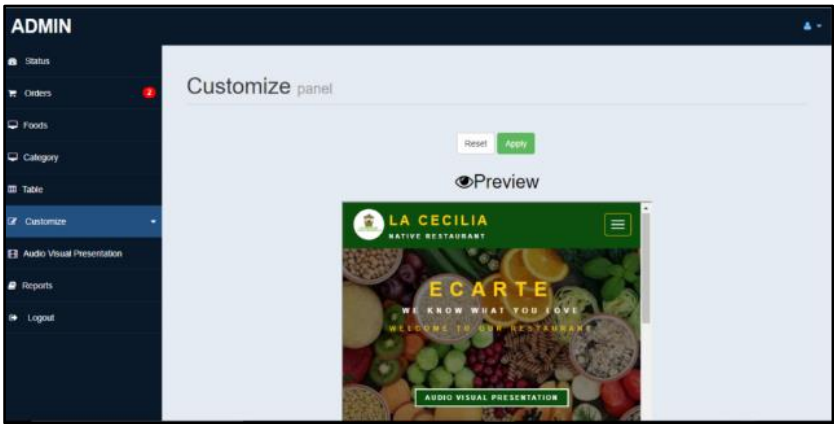
Figure 6. Customers' page preview

The system has a food panel (Figure 7) where the administrator can add and update pictures, price, and other details of their menu (Figures 8-9). If ever there are changes in the food details, the administrator could easily update that information. Most of the customers become upset when some dish listed on the menu are not available (Imperiale and Milewski, 2012). This feature will help the administrator to hide some dishes which are not available at a specific time.

Figure 7. Food panel

Figure 8. Update form (food)

The system also automatically generates sales chart daily, weekly, and monthly (Figure 10), highlighting the most starred dishes available in status panel (Figure11). The restaurant can then easily identify which dishes are marked favorite by the customers and which are needed for some improvements.
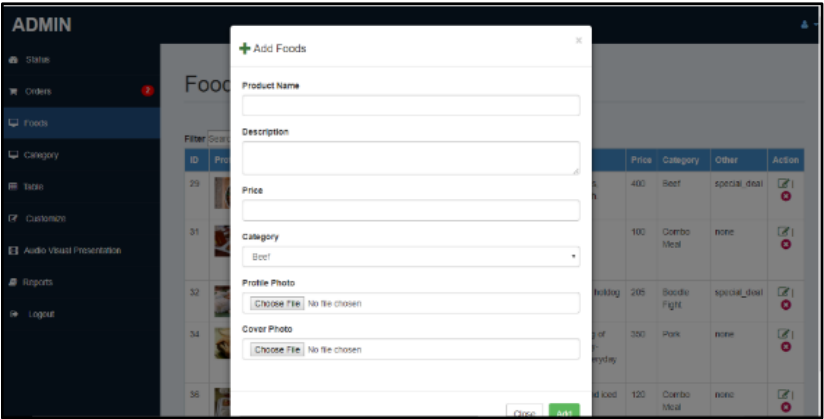
Figure 9. Adding form for food

Figure 10. Sales chart

Figure 11. Most starred

In the report panel (Figure 12), the overall sales report can be generated, which can be customized. The administrator can print the report for a specific date by setting "date from" and "date to." This feature allows the restaurant owners to track their sales and inventories easily.

Figure 12. Sales report

The restaurant staff could easily track customers' unpaid, delivered, and paid orders (Figures 13-15). In this section, all customer orders are listed in real-time. The administrator could click the action button located in the last column of each section if it was already settled.

Figure 13. Unpaid orders

Figure 14. Delivered orders

Figure 15. Paid Orders

Upon opening of the system, the customer needs to provide first their alias or code name in the startup page (Figure 16) to proceed to the main page. Alias was used instead of their true names for security reasons. After entering the customer's alias, the system proceeds to the homepage where AVP automatically plays. It also contains special deals and the best seller of the restaurant and other available dishes (Figures 17 and 18). AVP presentation will help the restaurant to promote more of their foods and services to the new customers.
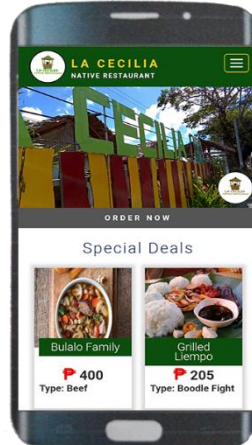
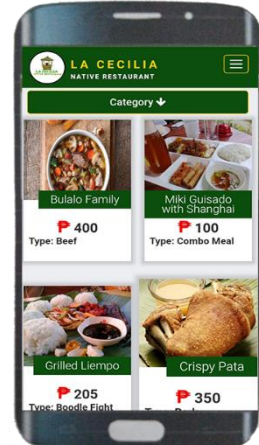Figure 16. Startup page   Figure 17. AVP   Figure 18. The food zone

The customer can search the food he or she wants to order and view its profile with the added description of the ingredients providing information about possible allergens (Figures 19-20). The customer could also write comments, rate the food, and read other customer's comments (Figure 21).
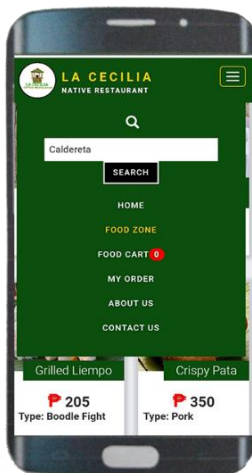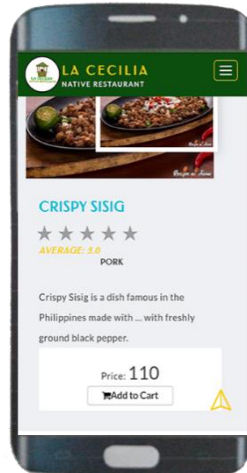

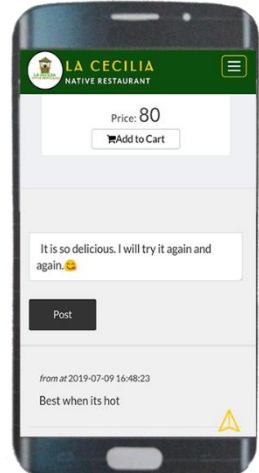Figure 19. Search   Figure 20. Food profile   Figure 21. Feedback

To order the dish, the customer needs to click add-to-cart button, and the orders will proceed to the food cart section (Figure 22). In the food cart section, there is an option to remove or add several dishes. If the customer agrees to the orders, he or she presses the checkout button and the checkout

dialog box appears where he or she enters his or her name and table number (Figure 23). Since some customers cancel their orders after checkout, the proponents added an order cancellation page, but it is limited only for a specific time set by the restaurant management (Figure 24).
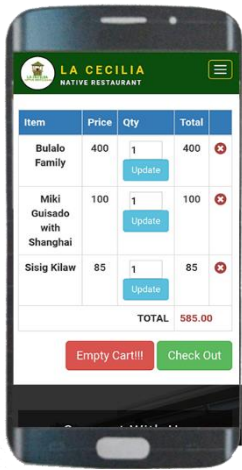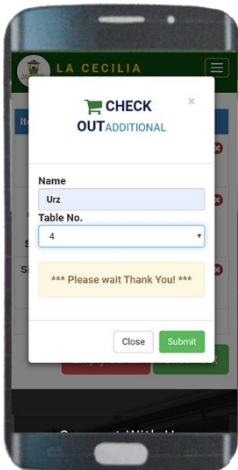

Figure 22. Food Cart   Figure 23. Check out   Figure 24. Order cancellation
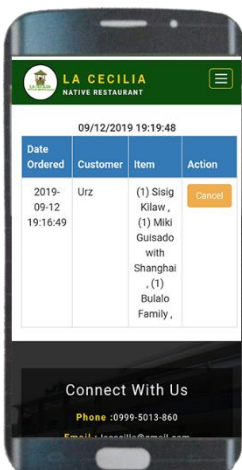
3.2 System Evaluation Result

Functional suitability with an average mean of 4.93, interpreted as excellent, shows that the system functions are appropriate and needed. Performance efficiency with an average mean of 4.88 (excellent) indicates that the system is responsive in real-time. Usability with an average mean of 4.84 (excellent) means that the system is easy to operate, pleasing, and satisfying for the user. Security and maintainability with an average mean of 4.83, interpreted as excellent, indicates that the system does not compromise any confidential information of the user and is applicable to any restaurants.

Table 2. Summary of the system evaluation

Criteria	Mean	Verbal Interpretation
Functional Suitability	4.93	Excellent
Performance Efficiency	4.88	Excellent
Usability	4.84	Excellent
Security	4.83	Excellent
Maintainability	4.83	Excellent

4. Conclusion and Recommendation

Based on the ISO 25010 evaluation result, the system, eCarte, is usable and met its expected functions. The system is generic such that any restaurant, specifically in Oriental Mindoro could adopt it. The system could gather customers' feedback without difficulty. However, the system has its weaknesses too – it could not analyze the customers' feedback; and for this reason, the proponents suggest further improvements. It is recommended to use an algorithm like the High Adjective Count algorithm and the Max Opinion Score algorithm for an effective analysis of customer sentiments. These algorithms not only classify a review as positive or negative, but also extracts the most representative features of each reviewed item, and assigns opinion scores on them.

5. Acknowledgement

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