SMART ORDER DEVELOPMENT SOLUTIONS APPS IN E-BUSINESS ACTIVITIES

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Abstract

Today, the old manual system of information requires manpower from the restaurant from writing down of orders, saving copies of receipts, and summarizing business transactions. It is also time-consuming for the part of the customers because it requires them to fall in line, place their orders and settle their bill. Waiting for their orders to be served may also take some time that can either serve the customers positively or negatively. This article focuses on the study proposes a Smart Order Application (SOA) Development Solution to support e-business activities and help for the restaurant business units operate efficiently, serve customers quickly, promptly and in accordance with the tastes of customers in today's era. SOA will replace the old order process and allow restaurant to create more professional service style, customers do not have to fall in line and wait for their turn to order. Integrate marketing in SOA, SOA will include function "Log in Facebook" which will let the customers like, share or check in at Phở restaurant and get free drinks or food. With SOA will make restaurant's menu vivid visually appealing, make a more effective and efficient business, it mean SOA improves

the speed of service and create a new order style that benefits both the customers and the management. Customers will feel a comfortable and convenient dine-in experience, while restaurant will be able to reduce its expenses when it comes to manpower. Since then, SOA enables business unit's profitable restaurant writing, profitability increased.

Keywords: **Smart Order Application; E-Business; Ha Noi; Phở Restaurant**

INTRODUCTION

People live in the era of technology. The world has been changed by the continuous development of the technology. It can be observed that a lot of people turn to technology in order to accomplish their tasks. Technology plays vital roles in various fields of work such as communication, health, manufacturing, and science. Most fast food chains like Jollibee, KFC, and McDonald's [1] use a POS system instead of a paper menu and other traditional order systems to make their services faster and more convenient. However, the existing order application system used by the aforementioned establishments still require manpower in the form of restaurant crew who directly take orders from the customers through a face-to-face interaction (Figure 1). Thus, the proponent thought of developing a smart menu application which enables the customers to choose their desired food and beverage using a non-paper menu - an electronic menu saved in a tablet which is considered as a popular and smart device that is widely used by everyone. The proponent believes that developing the smart menu application for Phở restaurant on Nguyen Chanh Street, Ha Noi will not only assist her friend, Congrad, but also help the entire company attain its mission and vision.

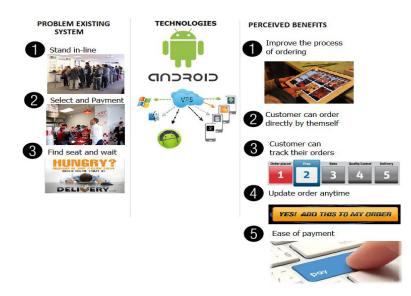**Figure 1:** Statement of the Problem.

Figure 1 shows Like most restaurants, Phở restaurant [2] on Nguyen Chanh street, Ha Noi is also using the traditional order method which requires the customers to fall in line to wait for their turn. In two trial examines, the forecast got from Lewin's field hypothesis was tried. The studies uncover that customers who experience a postponement amid the pre-process and post-process period of an restaurant visit assess the administration gave more adversely than customers who encounter a deferral amid the in-procedure stage. It is further anticipated that the level of instability about the length of the postponement and an individual's need state would impact his or her impression of a deferral and assessment of the restaurant service.

Waiting can be tedious, irritating, and incredibly frustrating. Simply envision the quantity of hours which customers spent under wraps out lines in lodgings, or how eager they get to be while sitting tight in line for theater tickets or waiting to be standed, seated in a restaurant. Maybe, everybody has their own share of waiting stories. Although some might review different events that were less inconvenient or situations when waiting was, in fact, a pleasant delay, establishments regardless of the kind of services they offer should always see to it that they provide their customers with faster and more convenient service. Depending on the context, a deferral might be experienced as an agreeable side interest or as a reprehensible inconvenience. It might pass rapidly or it might appear to keep going forever. How do customers react to different waiting situations? What are the determinants of their mental responses to such circumstances? Can a delay influence customers' overall evaluation of a product or service?

The study of waiting and delays is relevant, in particular, to services marketing. Delays undermine the efficiency with which these systems conduct their businesses; in turn, delays may affect consumers' perception of the quality of a service as well as their overall evaluation of the service. Although many delays are caused by inefficiencies in the service delivery process, waiting in some service situations seems to be almost unavoidable. For example, consumers often do not arrive at a restaurant at equal interval sequences but rather in a less predictable fashion. Moreover, some individuals may encroach upon the service time of others and cause them to wait. Managers may have difficulties regulating such waiting situations. Yet even in those situations, a service provider may be able to decrease the negative impact of such delays if he or she has some knowledge of the situational factors that influence consumers' reactions to delay. By uncovering the factors that influence psychological reactions to waiting and the contexts in which those factors occur, managers can have a significant impact upon consumers' satisfaction with the service encounter.

To overcome the above disadvantages, and help for the restaurant business units operate efficiently, serve customers quickly, promptly and in accordance with the tastes of customers in today's era. This paper study and propose a solution for the development of information technology applications to build a Smart Order Application (SOA), SOA will replace the old order process and allow restaurant to create more professional service style, customers do not have to fall in line and wait for their turn to

order. Integrate marketing in SOA, SOA will include function "Log in Facebook" which will let the customers like, share or check in at Phở restaurant on Nguyen Chanh street, Ha Noi and get free drinks or food. With SOA will make restaurant's menu vivid visually appealing, make a more effective and efficient business, it mean SOA improves the speed of service and create a new order style that benefits both the customers and the management (Figure 2). Customers will feel a comfortable and convenient dine-in experience, while restaurant will be able to reduce its expenses when it comes to manpower.

Figure 2: Demontsration Picture of the Idea.

RELATED LITERATURE AND STUDIES

Review of Related Literature

On the world, Azilen [3], the restaurant industry is an area which has remained behind the technical advances until recently, when the electronic menu (e-menu) started being used to improve catering services and increase revenue. Nowadays, the e-menu is becoming popular and changing the concept of food ordering by paper-based menus [1].

Lyle Bunn [1], the menu and promotion boards of quick serve and fast casual restaurants, bars, cafeterias, food courts and take out locations can deliver higher value to the establishment and its patrons. "Content" - the messages presented, primarily fulfill this goal based on suitable messaging technologies being in place. Menu boards typically include a product name, its image and multiple prices based on size.

By emenublog (February 24, 2015) "Digital Menu Trends 2015 – Revamp Your Airport Restaurant", has had an idea about a great e-menu which is used in airport. Many airport restaurants have already started being heavily value centric. Digital menu, being the medium of their value addition. Apart from an interactive menu that can help guests put forth their orders on their own". Accordingly, there are a few rising integration

models that airport restaurants are increasingly utilizing for helping airport visitors, along with awesome lists of edibles such as: Integrated Language Translators, Airport Navigation, Flight Information, Games, Weather Teller, Multi-Restaurant Menu Surfer, and Availing Meal Vouchers (Figure 3).
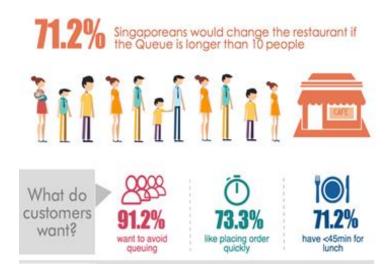
Figure 3: Result of Research about Customers Waiting to Order.

In Vietnam, Quyen Hoang, "Implementing electronic menu through sales management software SAPO", many elements to the success of the business of a restaurant, there is good food, luxurious, clean, professional staff, good customer policy (Figure 4). Now, many restaurants are adopting an electronic menu to order food on tables.

Figure 4: The Waiters Uses Tablets to Collect Orders.

Review of Related Studies

On the world, Aptito's iPad restaurant menus bring to eye-catching images of each item. Regular, text-type menus simply do not draw the attention like digital ones do [4].

Aptito's comprehensive cataloging of menu items and mouthwatering pictures introduce guests to delicious foods that would've otherwise gone unnoticed. Aptito provides an unparalleled dining experience with its digital menu to customer (Figure 5). With an iPad menu, customers are able to place orders, request a server's attention, view nutritional info, send special instructions to the chef and pay electronically without the hassle of trying to flag down a server.

Figure 5: A Simple and Effective System to Manage Order and Payment.

Faith Merino, "Technology trends and news" (May 20, 2011), SmartCellar which allows users to select from among dry, sparkling wines, white wines, red wines, rose wines, or dessert wines, browse profiles, regions, maps, and read in any of 150 languages (Figure 6). SmartCellar is currently available in some of the most famous restaurants in the world, including Wolfgang Puck's Cut in Las Vegas; Gordon Ramsay's Claridges in London; Barbacco in San Francisco; and The Moorings in Newport, Rhode Island.

Figure 6: Digital Menu for Restaurant of Aptito.

In Vietnam, Instead of manually writing bills, Xoi Yen used tablet Nexus 7 to order food and export the bill for customers. It is can be consider as sale management software. Accordingly, every waiter is equipped with a Nexus 7 to receive requests from

customers. When customers choose the menu on the tablet, waiters simply click into cells, each cell corresponding to one dish or beverage. Immediately, that information will automatically transmit information via Wi-Fi on the server, to the coordinator for information about food, the number of the table of customer (Figures 7 and 8). Then, staff will bring food to there with the invoice along.

Figure 7: A restaurant Customer tries Out the Aptito App on A Digital Menu.

Figure 8: Interface of SmartCellar.

Similarly, at one famous Phở restaurant on Nguyen Chanh Street, Ha Noi, customers feel really interested in order style. Here every waiter has an Ipad. Customers need to look at the paper menu on the table to select items, then the waiter select items following the customers' request but instead of manually recording order on paper like what other restaurants do, the waiter chooses items on Ipad, an automatic device will notify the computer at the kitchen and cashier to prepare food and export bill for
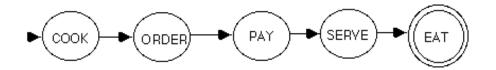
customer (Figures 9 and 10).

Figure 9: A Waiter is Equipped with an Ipad to Take Order.

CONCEPTUAL FRAMEWORK

Existing System

Figure 10: The Restaurant Process.

Theoretical Framework of the Existing System

Customers have to fall in line to order and pay for invoice at cashier, then they take their seats while waiting for their ordered food to be served. After eating, they leave the establishment. The problems here are: 1) Slow service and 2) Phở restaurant on Nguyen Chanh Street, Ha Noi is not yet well-known.
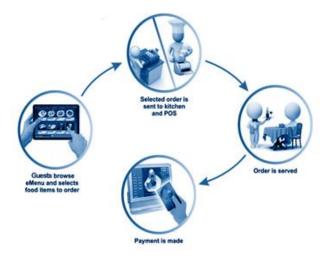
PROPOSED SYSTEM

Theoretical Framework of the Proposed System

First, the customers choose where their desired table. Then, they use the tablet to search and order food. Smart Menu Application displays the restaurant's best sellers and other products in promo. This may attract the customers to order more. Besides the information about dishes, the customers can customize their order. While browsing the
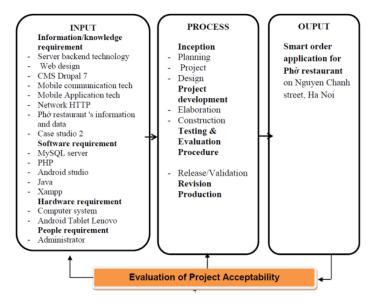
menu to look for their desired food and/or waiting for their ordered food to be served, the customers can use Facebook to like, share or post picture taken in Phở restaurant. The restaurant's management may give free drinks or food to customers who capture and share the food's photo on their Facebook walls. Consequently, both customers and restaurant owners benefit from the smart menu (Figure 11). The customers do not feel boredom as they wait for their food to be served, while the restaurant is also promoted through the said social networking site which is mostly used by people especially students (Figure 12). Once the ordered food is served, the customers just pay for their invoices.

Figure 11: The Proposal Process for Restaurant.

Conceptual Framework of the Study

Figure 12: Input-Process-Out (IPO) Chart.

METHODOLOGY

This section discusses the research design and methodology used in this study as well as data gathering instruments, preparation of instruments, retrieval of the instruments, software model used to develop the system and product evaluation.

Research Design

Research design is the framework that has been created to seek answers to research questions. The design of a study defines the study type, research question, hypotheses, experimental design, and, if applicable, data collection methods and a statistical analysis plan.

The purpose of the research design is to guide the proponent in the collection of data about the restaurant specifically its customers, cuisine, current system of taking and making orders, survey desires of customer and restaurant owner for this new project. After collecting all the necessary data, the proponent started designing a way to develop the project.

Respondents of the Study

To assess the system, the proponent purposely chose twenty respondents at Phở restaurant on Nguyen Chanh Street, Ha Noi. The respondents include five (5) co-founders, eight (8) staff, and random customers.

Data Gathering Instruments

Data gathering is an important aspect of any type of research study because data serve as foundation of any study. The data used in this study were collected using the following methods and instruments:

Observation: In this study, the proponent observed the restaurant's order system which includes the time spent by the customers in ordering, the time spent by customers to pay their bills, and the time spent by the customers waiting for their orders to be served. After analyzing the procedure and techniques on how the proposed and existing system worked. The proponent created a new system which can solve the current problems of Phở restaurant. The proposed system aims to help Phở restaurant improve its service, hence satisfying its customers' needs.

Questionnaire: A questionnaire is a research instrument consisting of a series of questions (the survey form) and other prompts for the purpose of gathering data from the respondents. The proponents used survey questionnaires to obtain a qualitative figure and observations of the prospective users of the proposed system. This

instrument was used to determine how the user evaluates the proposed system. The value of results depends heavily on the sincerity, truthfulness and objectivity of the respondents.

Interview: This method was used to get different opinions from the respondents of the study. It is considered another type of questionnaire in which the researcher gets the needed information from the interviewee verbally and directly in a face-to-face conversation. After that, the data gathered and information collected were analyzed, categorized, compared, interpreted and quantified.

Evaluation form: The proponent asked twenty (20) respondents to evaluate the services offered by Phở restaurant using the evaluation form made by the researcher.

Preparation of the Instrument

The proponent constructed a set of questions for an interview. The questions were answered and evaluated by the restaurant owner and staff and random customers.

Retrieval of the Instrument

Retrieval of instruments was made after its distribution and interview. In like manner, evaluation forms were retrieved after the development of the SOA framework.

Method Used in Developing the System

The proponent used Rapid Application Process with Prototyping in developing the system. This study aimed to design and develop a prototype of e-menu application for Phở restaurant.
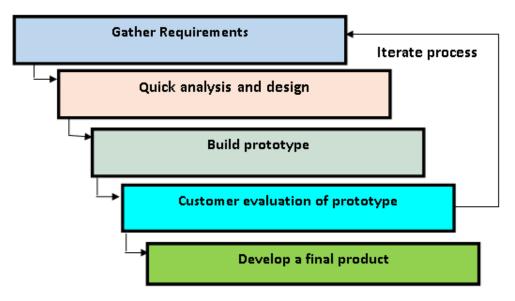
Regarding literature evaluation, Agile and Rapid Application Development (RAD) are interactive software development methodologies to react to the problems with the traditional waterfall methodology [5-7]. Agile approach starts from analysis requirements and design specifications, then directly to code and test software, whereas the RAD approach uses a prototype to get feedback from customers in order to enhance the prototype until the users are satisfied. This continuous feedback loop enables an RAD prototype to correspond exactly with customer needs [6].

RAD is appropriate for a small project, which has a shorter delivery time, but Agile is suitable for a larger project [8]. Furthermore, the RAD approach can enhance the features of the prototype more rapidly to deliver a workable and satisfactory system. However, using RAD with prototyping may make a system inadequate for overall business needs if the system is accepted by only specific groups of users [9].

This research proposed RAD as a development methodology to develop a prototype for several reasons. Firstly, RAD is an incremental software development process model by
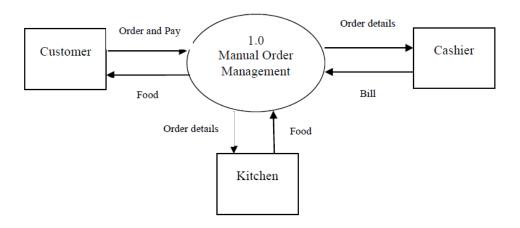
using customers' feedback. Therefore, the quality of the prototype will be improved throughout the life cycle as shown in Figure 3 [10]. Secondly, Hoffer et al. [9] point out that system developed by the RAD model both spend shorter time and is closer to the business needs than that by the Agile and traditional models. As a result, the prototype fulfilled requirements can be and developed rapidly. Lastly, Gantthead [11] mentions that RAD is more effective than Agile for a narrow project scope with a small implementation team (Figures 13 and 14). Therefore, a prototype which implements only some features by one person is more suitable for implementation by RAD than Agile approach.

Figure 13: Rapid Application Development (RAD) and Prototyping Adapted from Sommerville.
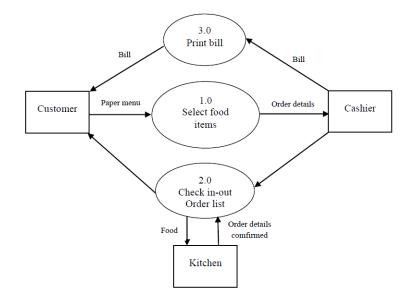

Order Management Model

Figure 14: Context Diagram of Existing System.

This Figure 14 shows the context diagram of the manual system of Phở restaurant services. It can be seen that the customers go to cashier and look at the paper menu there to choose and order items that they want. The cashier confirms order, prints the bill in three copies, one for the customer, one for the kitchen and one for the manager. Afterwards, the customers pay the bill and take a seat. After receiving order details, the kitchen personnel cook and serve the food to the customers.

This Figure 15 shows the detailed representation of the work of each entity. The customers choose items from paper menu and order at the cashier. The cashier writes down the food order details given by the customers to the official receipt. Next, the cashier prints the bill, gets payment from the customer, and gives the order details to the kitchen. After paying, the customers take a seat and wait for their orders to be served. The kitchen personnel inform the cashier if the food is ready before serving it to the customers.

Figure 15: Diagram 0 of Existing System.

This Figure 16 shows the context diagram of the proposed system for Phở restaurant. It can be seen that the customers, as they enter the restaurant, simply need to choose their desired table and choose items from the menu on tablet. Once they have chosen the items to be ordered, they will be prompted to click "Pay". Next, the order details will be sent to the cashier to print the bill and give a copy to the kitchen (Figure 17). The administrator is the person who manages the backend of the application.

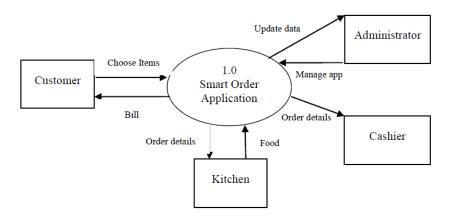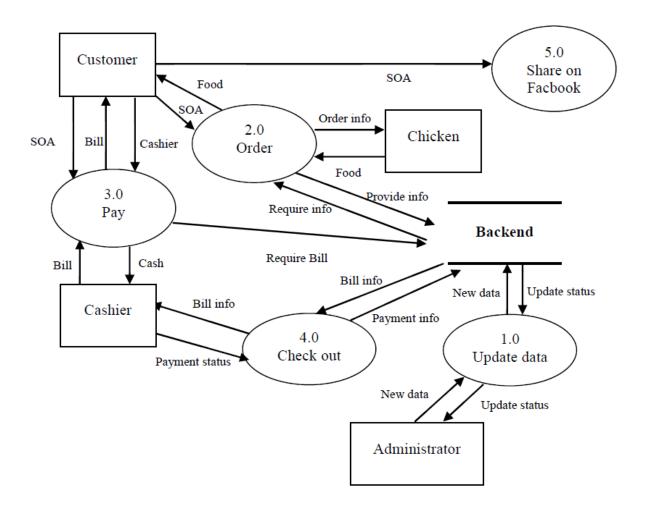**Figure 16:** Context Diagram of Proposed System.

Figure 17: Diagram 0 of Proposed System.

This Figure 17 shows the detailed representation of the works of each entity. The customers use SOA to order food and pay bills at the table once the bill is brought to them by the waiter. The cashier is responsible of printing the bill upon recipient of the payment requirement. In addition, they can use Facebook on tablet and share the food's photo to get a discount or free drink. The kitchen personnel who are sent a copy of the order will cook and prepare the items. The administrator, who is either the restaurant owner or manager can create and decentralize accounts that have the access to backend. Moreover, he or she can update the data of the application.

STATISTICAL TREATMENT

Statistical treatment of data is essential in order to make use of the data in the right form. Real data collection is only one aspect of any software; the organization of data is equally important so that appropriate conclusions can be drawn to compare the efficiency between the proposed system and the real system Data were captured and estimated by weighted mean. The formula for that is: The average of a set of *n* data x_i:

$$\bar{X} = \frac{\sum x_i}{n}$$

Where, $\bar{x}$: Weighted mean; x_i: Score; f: Frequency; n: Total frequency

The formula given above was used to evaluate the overall responses of the users about the system. Twenty respondents were selected from the restaurant including the restaurant's manager and staff, and random customers. Concept of evaluation survey included content, functionality, usability, reliability, efficiency and security (Table 1). Each feature has point scale called satisfaction scale from 1-5 that stands for poor, fair, good, satisfaction and excellent.

Table 1: Satisfaction Rating Scale.

Rating	Range	Verbal Interpretation
5	4.51-5.00	Excellent
4	3.51-4.50	Satisfaction
3	2.51-3.50	Good
2	1.51-2.50	Fair
1	1.00-1.50	Poor

Content: The system includes useful features that enable the user to update of the system content.

Functionality: The proponent tested the system to find out whether it performs according to the intended functions.

Usability: The proponent ensured that the intended user of the system can carry out the intended tasks efficiently, effectively and satisfactorily.

Reliability: The proponent tested the reliability of the system by conducting some tests that helped discover many problems in the software design and functionality.

Efficiency: The proponent saw to it that all resources required by a program to perform a particular function are present to be able to satisfy the customers' needs.

Security: The system is equipped with security to protect its data and maintain its functionality as intended.

RESULTS AND DISCUSSION

This section expresses the assessment and the statistical presentation of the data.

Project Description

This project aims to improve and market Phở restaurant's service process. The project includes the application run on tablet and the backend run on web. The administrator, the owner or manager, can manage and update the date of the application. Customers may find this application convenient for its new order style which also allows them to access their Facebook account and share each food's photo in exchange of a discount or a free drink.

Project Capabilities

Backend:

- The administrator can manage, create and centralize new accounts for anyone who needs to access or use the backend.
- The administrator can manage staff accounts.
- The administrator can update add, edit, and delete data for an application.
- The cashier can print bill.

Application: The customers can

- Choose items that they want.
- Make special requests for their food (e.g. less oil, more spicy)
- See the list of items that they chose and edit it if they want.
- Share the picture of the items they ordered with their friends by posting the photo on their Facebook account.
- Play games or use Facebook on tablet while waiting for the food to be served.

- Click to "Pay" button to confirm their order and get the bill for payment.

Project Results

The system was evaluated objectively by taking conducting a survey about the restaurant's current system among twenty (20) respondents that include the restaurant's owner, cashier, staff and random customers. The survey was divided into three parts which aim to get accurate feedback from respondents. The items are as follows:

Items for the owner/manager who use and access the backend

1. The application is easy to manage, and new orders can easily be made.
2. The application is easy to use update menu
3. The application is cost-friendly.
4. The system backend is well-secure.
5. The backend provides different authority to different users.
6. The backend applies the accuracy and completeness of the data.
7. Consistency can be seen on the information needed.
8. The application contains a suited interface for the organization.
9. The application helps improve the business.

Items for the cashier/staff who may use the backend and application

1. The system backend is easy to use.
2. The application has a suited interface for the organization.
3. Application helps the staff work more effectively and conveniently.

Items for the customers who directly use the application

1. The application has a user-friendly interface.
2. The application contains pertinent and relevant graphical icons.
3. Color and overall design are pleasing to the eyes.
4. The system can be learned by users very quickly.
5. Orders can easily be made using the application.
6. The application allows the customers to make special requests for item.
7. Food's picture can be shared using social networking sites.

Table 2 presents the respondents' overall rating based on the system's criteria. It shows that the respondents' rate of satisfaction is 3.80. The system was evaluated by the individuals who work in the restaurant as well as the customers who will use it. With the similar weighted mean of 3.72 and 3.75 from owner, manager and staff of Phở restaurant, it can be inferred that the system satisfies the needs of the restaurant because it helps them manage and serve their customers more efficiently. Furthermore, the customers' evaluation has the highest weighted mean of 3.92. This simply suggests

that the system meets the needs and standards of the customers. Besides, they can customize their order by making special requests, and they can even get a free drink or discount by sharing their favorite food via Facebook.

Table 2: Summary of Assessment by the Respondents.

Criteria	Mean	Verbal Interpretation
Owner/manager	3.72	Satisfied
Cashier/ staffs	3.75	Satisfied
Customer	3.92	Satisfied
The average rating of satisfaction	**3.80**	Satisfied

CONCLUSIONS

The old manual system of information requires manpower from the restaurant from writing down of orders, saving copies of receipts, and summarizing business transactions. It is also time-consuming for the part of the customers because it requires them to fall in line, place their orders and settle their bill. Waiting for their orders to be served may also take some time that can either serve the customers positively or negatively.

Using the Smart Order Application improves the restaurant's services. It also helps the manager promote the establishment by incorporating the use of Facebook. This application meets the customers' needs. It was evident in the survey and interview conducted that the use of this application garners positive perception and response from the respondents especially the restaurant's manager and staff for they can manage and update the menu flexibly in a fast and convenient manner.

ACKNOWLEDGEMENT

REFERENCES

1. www.LyleBunn.com
2. Http://phovietnv.com
3. Azilen Technology (2011) Significance benefits and role of digital menu in restaurant.

http://www.articlesbase.com/business-opportunities-articles/significance-benefits-

androle-of-digital-menu-in-restaurant-4925002.html

4. Concept (2012) iPad eMenu for restaurant.
   http://www.emenu-international.com/iPad-menu-for-restaurants

5. Rao NK, Kavita Naidu G, Chakka P (2011) A Study of the Agile Software Development Methods, Applicability and Implications in Industry. International Journal of Software Engineering and Its Applications 5.

6. Meso P, Jain R (2006) Agile software development: adaptive systems principles and best practices. Information Systems Management 23: 19-30.

7. James M (1991) Rapid Application Development. Macmillan. pp: 81-90.

8. Khan AI, Qurashi RJ, Khan UA (2011) A Comprehensive study of commonly practiced heavy and light weight software methodologies. International Journal of Computer Science 8: 441-450.
   http://www.techrepublic.com/whitepapers/a-comprehensive-study-of-

   commonlypracticed-heavy-and-light-weight-software-

   methodologies/3809811/post

9. Hoffer JA, George JF, Joseph V (2008) Modern systems analysis and design. 5th ed., USA, Pearson Education.

10. Ian S (2004) Software Engineering. UK, Addison Wesley.

11. Gantthead (2010) Rapid Application Development process.
    http://www.gantthead.com/content/processes/11306.cfm