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Original Paper

Analysis and Design of Shaxian Snack Catering Management Information System

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Abstract

This paper first expounds the background, purpose and significance of the research on Shaxian snack catering system. Moreover，the daily business process and data flow of Shaxian snacks are analyzed in various aspects to improve the design thought. Combined with functional analysis, background code and pages can be made easily. Finally, the system is tested and the system logic is found. The actual data are used for data statistics, and the last step is modifying and improving. Then the interface of the catering system was made and the design of the catering system was implemented and developed. Finally, the completed restaurant system was tested, the system was tested for deficiencies, and the missing places were modified.

Keywords

catering, data statistics, management information system, business process

1. Introduction

With the development of the times, people's demands on catering industry are constantly improved. A good management information system is the embodiment of catering industry's service quality and the guarantee of economic benefits. The restaurant industry plays an important role in the service industry. The price is affected by many factors and discounts are greatly influenced by such as festival and season. With the improvement of consumption level, the traditional manual mode is not suitable for the development of the catering industry, "Internet +" is through positioning, order to pay, big data, drainage, to promote the development of catering industry (Cheng, 2015), so must now rely on computer technology to improve competitiveness.

Management information systems are characterized by the ability to generate periodic reports that managers use to process daily tasks, providing useful information, improving management effectiveness and providing daily decision-making information ((America) June Jamrich Parsons Dan Oja, 2011). At present, domestic information management system still needs to be improved so that the development level of information management system is close to that of foreign countries (Jeff, 2002). The ultimate goal of the information system of catering management is to standardize the management standards of catering industry and improve the overall service quality of the industry. Through the management system, the status quo of the operation can be analyzed to improve the market adaptability, so as to reduce costs, save costs and strengthen management to improve the competitiveness (Sue Spielman, 2004).

Based on the actual situation of small and medium-sized restaurants, takes the ShaxianMinan restaurant as an example and analyzes the business process of Minan snacks in Shaxian snacks by combining the system development life cycle, so as to carry out the planning, analysis, design and implementation evaluation of the snack system in Shaxian snacks. Through this system, the error rate caused by manual operation is greatly reduced and the statistical data analysis function is provided to help the catering manager to make correct decisions and analysis, so as to improve operational efficiency and income.

2. Research Method

In the practical application of information systems, it is difficult to grasp the essential characteristics of information systems from only one aspect, so it is necessary to study and apply information systems from both social and technical aspects. In the study of the entire Shaxian minan catering system, the life cycle law is implemented consistently.

Demand analysis is the beginning and the most important key point in the study of a system. Field visits and access to data are the main methods in the research of Shaxian minan catering system, so that you can better understand social needs and business processes and data processes.

In terms of technology, combining the needs of users and managers, Shaxian minan catering system takes the version of Eclipse Mar as the development platform, use JAVAEE three-layer architecture, Web layer, service layer and dao layer to implement development, use mysql5.5 database for data storage, combines bootstrap, jq and js for front-end page design and completes the system. In addition, Python technology is used to collect data that are analyzed by using the method of higher mathematics line probabilities, and then the system is further studied.

3. Systems Analysis

System analysis is a process of analyzing, researching, judging and improving the original system with purpose and steps in practical application, which determines whether a system can be successfully developed (Gao, 2014).

The tasks of the beverage system analysis are mainly to put together the collected literature and materials about food and beverage, to conduct a rigorous global analysis of the internal organization of the food, beverage store, the information processing process of the food and beverage store in accordance with the requirements of the beverage business and the smoothness and reasonableness of the business.

The beverage management information system is an online and offline management information system. For the situation of large number of people in the store, the restaurant system of Sha country can be used to quickly complete the on-site food ordering and payment. At the same time this system also provides the selling point meal service. It sets up some graphical interface backstage inventory management to facilitate managers to view inventory information and sales information. The system design process includes five stages: system planning, system analysis, system design, system implementation, system operation and system maintenance (Li, 2014).

4. The Function Modules of System

According to the processing function of Shaxian snacks, the functional modules of the catering system are designed. The catering system is divided into five modules: catering front management, catering backstage management, inventory management, distribution management and kitchen management. Figure 1 provides the example of partitioning the function modules of this system.

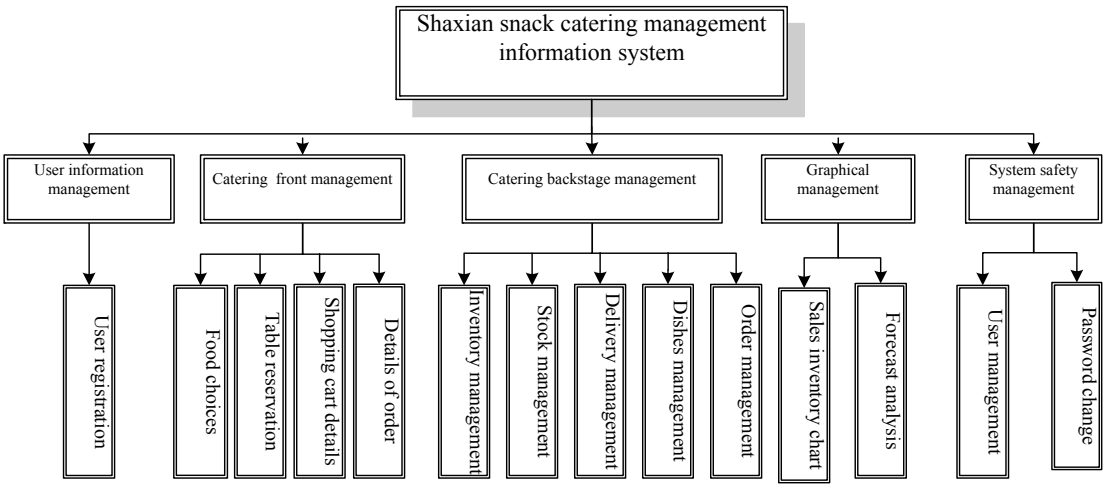

Figure 1. Function Structure Shaxian Snacks Catering Management Information System Diagram

4.1 Catering front Management Module

The catering front management module includes:

(1) User management: users can log in and register their accounts at the front desk.

(2) Ordering management: users can check, add and delete dishes according to their own preferences.

(3) Shopping cart management: users can review the dishes they selected last time and add or delete dishes as required.

(4) Table reservation: the user can submit the name, contact information, reservation number and reservation time to the background on the page.

(5) Order viewing: users can view detailed purchase records.

4.2 Catering Backstage Management Module

The catering backstage management module mainly includes: passing the orders that have been paid to the kitchen staff, accepting and checking the order information, informing the inventory staff the quantity of ingredients required, and sorting out the delivery information, warehousing information and inventory warning information set by the inventory staff.

4.3 The Inventory Management Module

The inventory management module mainly includes checking the inventory information, delivery information, providing the information of purchased food and materials for the suppliers, obtaining the warehouse information and submitting it to the system. The inventory staff can set the warning information of the stock ingredients according to the daily business demand and the delivery information.

4.4 The Kitchen Management Module

The kitchen management module mainly includes making dishes according to the paid orders provided by the system.

4.5 The Distribution Management Module

The distribution management module mainly includes: waiters distribute good dishes made in the kitchen.

5. Database Design

The primary purpose of a database is to retrieve, store and manage data resources adequately (Yuan, 2007). In the Shaxian snack catering management information system, there are many data processing behaviors because of the interaction between the front-end and back-end data, therefore the implementation of various functions needs to be supported by the database. The database is designed to provide users and systems with efficient and good operating environment. Its operating environment includes: high efficiency of database data storage, good operation management of database system, high utilization rate of database storage, etc. (Sa, 1991).

The designer will make a detailed analysis of the requirements provided by users, and form an independent conceptual model of the catering management information system through systematic synthesis, systematic induction and other means, and represent the conceptual model by using the E-R diagram. The system E-R diagram is shown in Figure 2.

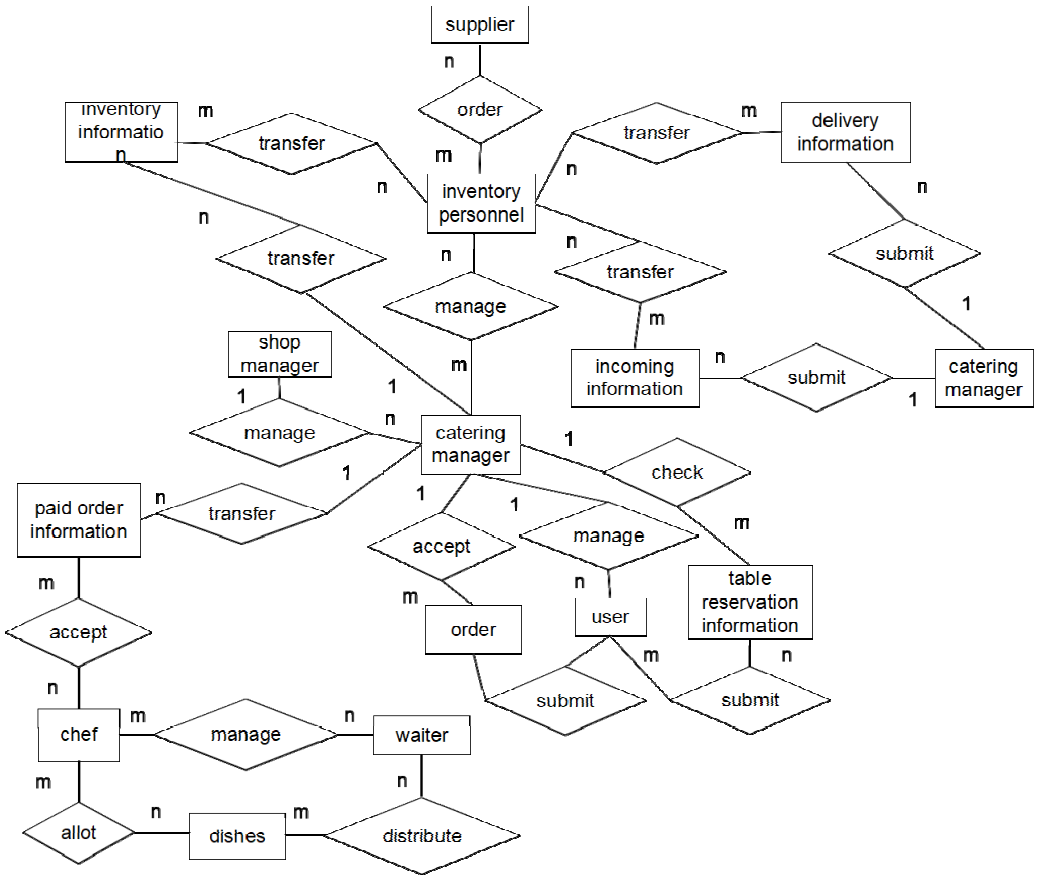

Figure 2. Overall System E-R Diagram

6. Data Flow Analysis

Data flow design is mainly about the analysis of information flow, information processing, information transfer and information storage. Its purpose is to find the problems in the management information system in advance, such as poor data flow, and solve the problems through reasonable measures so as to make the data flow unblocked.

As a management information system development tool, data flow chart is an abstraction of information transmission in the organization and a manifestation of system logic model. Data flow chart is used to describe the process in which the data in the system flows into the system from external entities, passes through some storage and processing in the system, and finally leaves the system for use by other external entities (Yuan, 1999).

The top-level flow chart of ShaxianMinan Catering System is developed according to the front-end management and the back-end management of ShaxianMinan Catering System. The first-level data flow chart of the corresponding ShaxianMinan Catering System is shown in Figure 3.

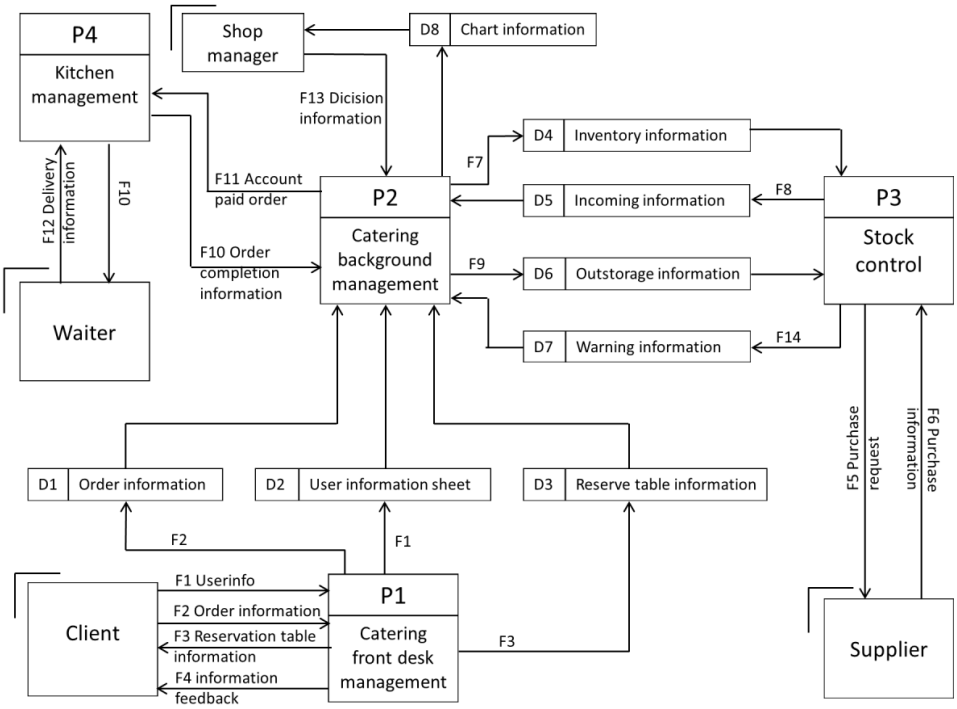

Figure 3. The Data Flow Diagram of Catering System

7. Data Analysis

In order to study and analyze the consumption of stock materials in Shaxian minan catering and to predict the consumption in the later period, a common forecasting method is adopted: exponential smoothing method (applicable to the prediction of short-term and medium-term economic trends). The process is as follows:

1) Collect and consume the consumption data of stock ingredients for nearly 14 days (nearly 2 weeks) as a txt file.

2) Use the written java code (by calling the bat file) to indirectly call the encapsulated exponential smoothing code to analyze the stored consumption of the stored txt file (exponential smoothing code is encapsulated three smoothing formulas).

The second exponential smoothing prediction of 14-day food consumption is made by using the second exponential smoothing prediction model, as shown in formula (1)-(4):

$$\begin{cases} S_t^{(1)} = ay_t + (1-a)S_{t-1}^{(1)} \\ S_t^{(2)} = aS_t^{(1)} + (1-a)S_{t-1}^{(2)} \end{cases} \quad (1)$$

$$y'_{t+T} = a_t + b_t T \quad (2)$$

$$S_t^{(2)} = aS_t^{(1)} + (1-a)S_{t-1}^{(2)} \tag{3}$$

$$\begin{cases} a_t = 2S_t^{(1)} - S_t^{(2)} \\ b_t = \frac{a}{1-a}(S_t^{(2)} - S_t^{(1)}) \end{cases} \tag{4}$$

The third exponential smoothing prediction of 14-day food consumption is made by using the third exponential smoothing prediction model, such as formula (5)-(9):

$$\begin{cases} S_t^{(1)} = ax_t + (1-a)S_{t-1}^{(1)} \\ S_t^{(2)} = aS_t^{(1)} + (1-a)S_{t-1}^{(2)} \\ S_t^{(3)} = aS_t^{(2)} + (1-a)S_{t-1}^{(3)} \end{cases} \tag{5}$$

$$x_{t+T} = A_t + B_t T + C_t T^2 \tag{6}$$

$$A_t = 3S_t^{(1)} - 3S_t^{(2)} + S_t^{(3)} \tag{7}$$

$$B_t = (\frac{a}{2(1-a)^2})[(6-5a)S_t^{(1)} - 2(5-4a)S_t^{(2)} + (4-3a)S_t^{(3)}] \tag{8}$$

$$C_t = (\frac{a^2}{2(1-a)^2})[S_t^{(1)} - 2S_t^{(2)} + S_t^{(3)}] \tag{9}$$

3) After parsing the txt file with the packaged python code, a picture including actual data and predicted data is formed.

4) Use the written base 64 function to encode the image and render it to jsp.

The predictive analysis is implemented as shown in Figure below.

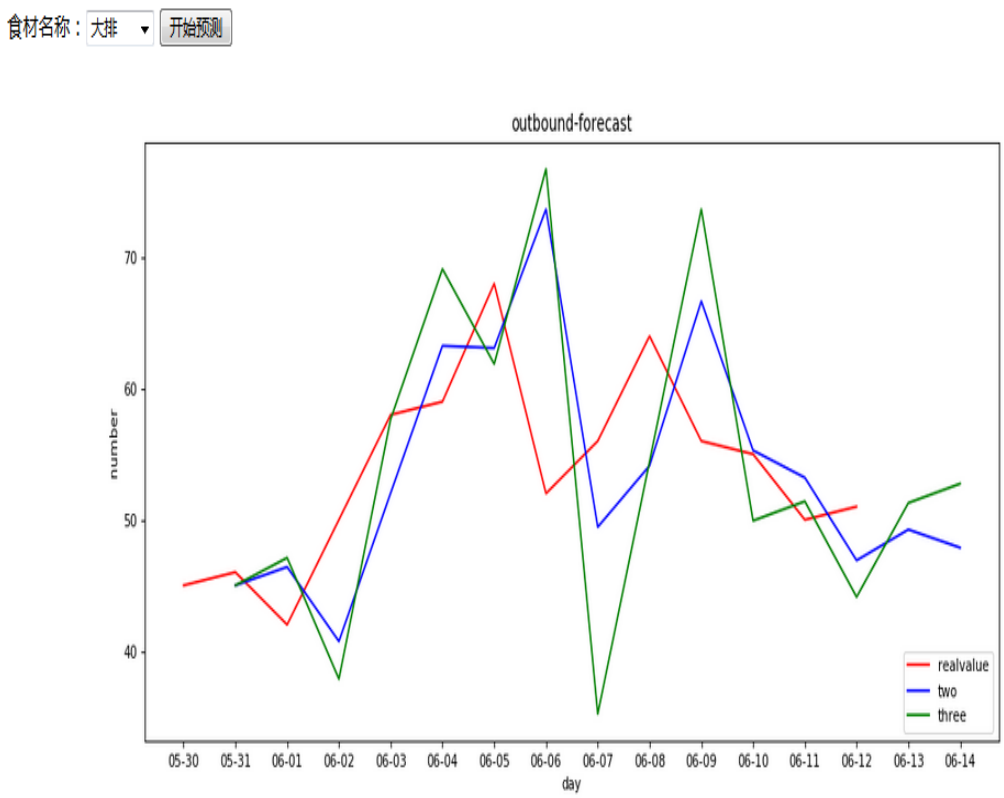

Figure 4. Forecast Analysis Page

It can be seen from the above figure that an exponential smoothing and quadratic exponential smoothing are generally applied to linear data, and one exponential smoothing has hysteresis, and the second exponential smoothing effect is much better than an exponential smoothing, which is equivalent to an enhanced one exponential smoothing. When the inventory consumption data is linear, it has a good prediction effect, and the secondary smoothing not only takes the historical data average and change trend into account, but also considers the upward trend or the downward trend of the current food consumption data change. The third exponential smoothing can be applied to parabolic data, and seasonal effects are more considered than secondary smoothing. For the relationship between the inventory consumption of certain ingredients and the season, the third exponential smoothing should be considered.

8. Conclusion

By starting from the actual of Shaxian county food, with the demand of food and beverage users and operations managers, using javaee three-tier architecture, combined with js, mysql, JSP, the bootstrap, jq, and by using B/S development mode has developed a catering management information system, this system meet the needs of users and administrators, basically realized the function of should have.

In the background page, the catering manager can view the database information through the function on the page. However, the only problem is that although the catering manager can clearly see the relevant data in the database and present it to the manager through tables, the manager needs to analyze the data trend, the gap between the data and the size of the data by himself. In order to solve this defect, this system designs a function that can make the data into graphics and convert the originally abstract data into intuitive and specific graphics. The display selects the sales data of the previous ten days and generates the sales line chart of the previous ten days.

Shaxian snacks still stay in human management. During the peak time for meals, there are many careless mistakes, which highlights the necessity of the development of this catering system. The use of this catering management system can greatly improve the efficiency.

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