A Study on the Understanding of Restaurant Information System

: Focus on Point-of-Sale System

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Ⅰ .Introduction

The introduction of personal computers and software in the restaurant industry has changed restaurant style. One of those changes is POS or point-of-sale system which is designed for monitoring cash balances, scheduling production, processing transaction, and generating report among other processes. As new features continue to emerge for the POS system, it will become an increasingly beneficial tool of POS system (Kasavana 96,1991).

When making a guest check, computer analyzes a data in various aspect. From this data a POS system produces a variety of report. From the guest checks the system will analyze balances, taxes, and tips. It can categorize profit into major group sales, menu item sales, and time period sale. It can also estimate labor cost and labor availability. By studying these reports,

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management will become better informed and be able to make more effective, accurate decision (MICROS 8). Even further, foodservice professionals are faced with new possibilities for information management. The foodservice industry has outgrown the basic questions of whether to computerize recipes, nutritional analysis, accounting, inventory, purchasing, or diet office. Today, the industry recognizes the benefits of all. Now the issues are integrating applications, improving usability, and adapting technological tools in order to achieve business objectives.

Ⅱ. Usage of Point-of-Sale System

1. Structure

The hardware for POS system can be divided into three main areas. The front of the house has terminals. POS terminals come in different shapes and sizes. However, there are two terminal types. A server or pre-check terminal is used for entering orders only, while a cashier terminal has a cash drawer. A cashier terminal, which can be used for both entering and settling checks, may support up to four cash drawers. A terminal may consist of a display screen and keyboard, touch-screen and keyboard, or just a touch-screen. It may also have a guest check printer and a magnetic stripe reader, an input device that can retrieve data from the magnetic film strip found on the back of credit or employee identification cards (Collins 38). In production area, there are output devices such as display terminals and printers. These devices are needed in each key station of the kitchen. And there is the back-office hardware. This may simply be a specialized box connected to the front-of-house, or it may be more like a regular PC. Mainly, you will use it to collect information from, and deliver it to, the units out front, and you will use it to print managers' reports (Grimes 16)

2. Basic function

Information provided by POS system makes fact-finding and decision making infinitely easier. Here are a few benefits when we using POS system

1) Daily financial reports

These reports should give you sales information and analyses in the format you want. They should tell you what you sold, how much income you generated for the day, your payroll cost, guest-check

average, average check per person, customer count, sales per worker hour, persons served and more. These reports are tools that are necessary to control cost and improve efficiency.

2) Server reports

These reports help make tip reporting a non-recurring nightmare. A record of each server's sale is easily maintained by POS systems, and tip allocation records can be updated quickly. Server reports can also gauge productivity. Sales figures generated by the reports disclose which servers are doing their job well and which ones are not. This information can help determine whether additional training will help improve server sales.

3) Timekeeping

features of POS system can easily control the payroll cost. Daily reports and payroll registers can show your payroll cost by the hour, by shift and for the day. Sales analysis reports can help control scheduling and other related problems. The sales analyses reports are important management tools that can help control costs.

4) Guest-check tracking

Guest-check tracking by table or check number is an invaluable feature. Missing checks are quickly spotted and open checks are easy to track. The

system should be able to split checks. An "elapsed time" feature can help table turnover.

5) Bar-codes

Bar coding is playing a larger role in today's computer software. Hard guest checks are easy to track. Menus can bar-coded and read with a light pen. Inventory control using bar codes will eventually be an industry standard.

6) Credit card authorization.

This feature is important in today's world of "plastic" money. Credit Card Authorization (CCA) and Electronic Draft Capture (EDC) are becoming a "must" on POS system, since credit cards are becoming the preferred payment method by consumers (Pappas 20).

7) Table management system

This system should be capable of call-in and walk-in reservation requests, notifying waiting guest when a table is ready, establishing restaurant-wide communication linkages, automatic table section based upon availability status, maintaining current table status information and indicating elapsed time of service for all occupied tables.

A table management system may enable restaurateurs to balancing seating and service patterns through customized graphic and communication options. (Kasavana 3).

3. Software application

Software applications developed for MS Windows and non-proprietary technologies form the basis for many emerging trends in the application of information technology to foodservice, with emphasis on innovative cost management.3 Among them are purchasing, receiving, inventory, menu planning, point-of-sale integration, and overall systems integration

As computer hardware continues to become more standardized, competing vendor systems will be differentiated by the strength of their application software. Software capable of supporting enhanced pre-checking, production coordination, and customer service. Rather than food service software remaining procedure driven, systems are evolving that are data driven. In other word, after a server places a customer's order into the system the order relayed from a service station terminal to a master production area terminal. This revolutionary production area equipment may be capable of splitting, distributing, coordinating, and controlling production, delivery, and service. (Kasavana)

1) Purchasing

To manage food costs effectively, managers are employing several strategies. One is just-in-time purchasing, which requires finely tuned product forecasting, as well as the ability to place and process orders with a short turnaround time. Technologies such as EDI (electronic data interchange), singular user interfaces for placing electronic orders for purchasing through a variety of distributors' computer systems, and fax modem transmission are all replacing traditional telephone ordering. Two-way communication supported by computers means that purchasers receive feedback and troubleshoot order fulfillment problems more efficiently. Managers who use bid analysis as a basis for purchasing decisions can obtain price information electronically and automate the process. What about the single bid that involves multiple vendors? Complex variations of the bid system can be accommodated through relational database systems.

Purchasing flexibility based on price poses additional issues. The manager who does not wish to be locked into a single distributor for any one product needs a robust information system to support flexibility. To make cost effective decisions as prices fluctuate, the manager needs to know current prices and which purveyor offers the lowest price today. An information system built to accommodate electronic price updates can provide real-time price information, and identify the lowest price for each item if desired. If the

system is designed using a relational database, it can also permit queries and user-defined reports to identify products with significant price swings.

For example, a user might choose to query a relational database to find out which items have changed in price by more than 10% since the last order, or which five items contribute the highest cost to tomorrow's menu. A query is a tool that permits users to "mine" their own databases for useful information in a self-directed, dynamic fashion. Today's software tools even allow users to word their queries in plain English, rather than having to understand data fields and database design. Based on information received through queries and customized reports, a manager can make up-to-the-minute decisions to control food costs.

2) Receiving

To track and control product flow, many operators use bar-coding technology or pen-based computing for data entry. Radio frequency devices may be used to transmit information from a bar-code scan to a computerized inventory system wirelessly and in real-time. Another technology, voice recognition, is gaining some popularity because it is hands-free and can improve productivity.3 Each of these technologies is broadly available on an open platform. In addition, the most efficient systems allow users to check in orders by exception-only data entry. Then, they automatically place products, with up-to-date cost information, into the inventory database.

3) Inventory control

One expert sums up the trends in inventory management as a shift towards "a continuous flow of material and information," and adds "On-line and even real time information systems are replacing batch systems." 4 The rapid availability of information supported by new technologies is essential to this management process. Today's information systems offer another type of flexibility, too. A user who wishes to switch vendors and/or products frequently, in order to reap cost advantages, has to contend with varying pack sizes and issue units. Maintaining product information in a relational database

system makes it easier for users to specify multiple sets of data related to a single item multiple vendors, prices, and packaging, for example. Inventory changes sometimes require changes to recipes, too. These are accomplished easily through real-time, global updates.

4) Menu planning

From a menu planning perspective, the value of contemporary technologies is in " what-if ". A user can experiment with various menu offerings and recipe ingredients to find the cost-effective choice that meets nutritional, aesthetic, and quality requirements. As food prices change, a user can experiment with alternatives, immediately viewing the impact on the per-serving cost, menu cost, forecasted revenue, or other user-defined financial criteria. Queries may help the user identify possible inventory items that meet specified criteria, such as a tomato-based product that costs less than five cents per-serving, or the salad green with the lowest price this week. As alternatives are selected, they may be plugged in on a menu screen, with real time updates carrying through to published menu descriptions, inventory requirements, ingredient pull lists, production instructions, scaled recipes, nutritional analysis totals, and so forth. (Grossbauer)

Ⅲ.Choosing a Right Point-of-sale System

1. Minimum requirement

Shopping for a POS system takes time and careful planning. There are dozens of vendors selling excellent POS hardware and software that can help improve efficiency and control cost. There are so many options available for

the POS buyer today that an attempt to establish standardized guideline is very difficult. But there are a few important points should be checked. Here are those (Herlong 20).

1) The speed of processing

To evaluate speed, obtain the time values associated with opening a check, adding on items, voiding items, settling the check, and capturing a credit card authorization. Look for terminals where descriptions of PLU numbers can be quickly accessed and screen and keyboard layouts are well organized and not too crowded.

2) Hardware type selection

When choosing a POS system, it is important to assess the user's skill level and training heeds. Terminal selection should be based on the needs and quirks of the user. Provide employees with the opportunity to experiment with the POS system under consideration. Observe their reaction to them, perhaps administering a survey for additional feedback (Collins 39,40).

3) Menu maintenance

In a good POS system, menu maintenance should be relatively simple. Make sure menu prices and sales tax can be easily changed in-house on the system. You could spend a fortune having it reprogrammed by a programmer.

4) Maintenance contract

Computers today are very reliable. But if there is going to be a breakdown in your system, it is going to happen when you are busy (Murphy's Law). Try to get a "quick service" contract if possible. Avoid maintenance contracts that do not specify a reasonable timetable for repairs.

5) Serviceability

Serviceability is the time and effort required to servicing a POS system and directly affects labor efficiency and store profitability.

POS hardware designs should focus on the ability to dis-assemble, repair and reassemble with little effort and minimal technological expertise. By incorporating electronic components, cables, and peripherals that are easily accessible, vendors reduce service downtime for customers.

6) Training mode

Do not buy any POS system without this function, which lets you train servers at any time. Practice transactions are automatically separated and will not affect the day's sales figures. Training employees to use POS equipment is vital to the success of POS operation. Proper training will eliminate errors and spend order entry (Herlong 20).

7) Site preparation

The most important concern of management is site preparation. Unfortunately, site preparation is too often a cost that is underestimated or ignored during system budgeting and planning. Site preparation concerns focus on architectural, engineering, and interior design work. Another concern of restaurateurs is aesthetics. To maintain a desired dining room appearance, for example, it may be necessary to snake cabling around or through existing barriers and to recess ECR/POS devices into counter or workstation surfaces.

8) Environmental packaging and security

The hospitality environment is the harshest environment in the retail marketplace and presents its own challenges-from seaside food kiosks and hotel pool bars to dual branding concepts and combination convenience stores with quick-service restaurants.

POS devices that are subjected to environmental tests such as temperature and humidity, contamination resistance and impact specification during the development process will ensure that the system will withstand the realities of the hospitality environment.

Not only must the POS withstand its environment: it also must withstand its user. In addition to providing tight monetary control, operators also need to

keep the transaction data secure. Any intrusion into the transaction data, whether accidental or deliberate, can result in both tangible and intangible losses.

However, physical security is insufficient by itself. An operator also needs logical or data security. Foodservice operators today will say that at any given time, the amount of cash in the drawer is far less valuable than the credit transactions, marketing data, demographics, buying patterns or frequent-diner information. As the value of such consumer data increases, there is more valuable data on the hard disk or in memory waiting to be uploaded for processing.

9) Human interface

For restaurant associates who may lack computer proficiency, the POS system must be easy to learn and use. Ease of use is simple leveraging the full potential of technology through Human Factors Engineering. HFE enables a vendor to develop system, which take a scientific approach to advanced human interfaces by combining the user's expectations, frame of reference and physical capabilities, with flexible hardware and software.

A number of POS vendors who claim ease of use in reality lack the experience and resources to fully leverage the full potential of technology. POS vendors that take advantage of HFE in the long run will provide devices that take a scientific approach to human interfaces by combining the user's expectations, frame of reference and physical capabilities with hardware and software. The success of those efforts is measured by learning and productivity benchmarks, such as establishing a level of expertise in new employees and expanding the productivity of experienced associates to manage additional functions at the point-of-sale. (Butler 30)

10) Training

No matter how well the system is conceived and implemented, training is of paramount importance. Getting management involved with and supportive of training can be the critical difference leading to a successful systems

installation. Most industry experts warn that management must project the cost of ongoing training as a contributory cost during system selection (Kasavana 76,1989).

11) Diagnostic capability

The system's diagnostic capability, which verifies the functionality of the terminal's components, external peripherals and communications, is a key element in servicing the terminal. The objective of diagnostics is to provide a simple means of isolating and identifying faults, so that if a repair person is required, he will arrive with the correct part the first time. A comprehensive set of support tools also should be available to assist in the isolation and resolution of hardware and software issues.

2. Future Development

1) Using of non-proprietary software system

Typical computerizes foodservice operation uses several proprietary software systems. One may be for Kitchen management, another for point-of-sale, another for nutritional analysis. In those instances, vendors of proprietary foodservice software have developed custom interfaces from one program to another to attempt to open communications among applications. These interfaces are expensive to develop, and of limited availability. But with the advent of the Microsoft Windows operation platform, which supports standard data transfer protocols, the basic operation of personal computers is being modified to allow simple integration of a variety of functions. Also windows allows computer users to multitask (let the computer and user work on more than one task at a time), and it offers a graphical user interface (use of icons or pictures and an input device such as a mouse to allow users to direct the computer). In fact, according to one industry expert, "Due to the widespread availability of programs and business applications that run in Windows and Windows 95, this environment has become the mostly widely accepted ones.

2) Open architecture

Open Architecture allows a system to connect readily with other technologies. For example, an open system from one developer may easily accommodate a bar-coding or radio-frequencing device developed by another. Open systems provide flexibility to advance with the technology regardless of which developer has the technology in demand. A choice for open systems also arms the foodservice operator with shopping power the ability to shop among vendors for the best product fit and the most competitive one.

In all, non-proprietary, open systems permit users to keep pace with advancing technology. Users can pick and choose the most effective management tools, without being limited by the technological capabilities, time constraints, or pricing structures of any single vendor.(Lynch 51)

3) Overall system integration

Traditional foodservice information systems planning has focused on "stand-alone." Gradually, operators began to examine the value of interfacing systems. Today's business information systems are transcending the concept of interfacing, choosing instead a seamless integration approach.

One such approach is data warehousing. Based on client/server technologies, a warehouse uses one, massive database system for all an organization's information. As designated, users can access the information they need. As users enter data, the information immediately becomes part of the single, enterprise-wide database. This approach is being adopted in major materials management systems, as well as in healthcare organizations. To share information over distances a strategic goal of any organization with multiple sites information systems professionals are taking advantage of other new technologies. MS Windows has many built-in capabilities that support communications. For example, remote access may be used to link a facility to a corporate office. Payroll time sheets, invoices, and other time-sensitive electronic documents may be transmitted this way. A manager may also use remote access to telecommute to check on the day's sales, print reports, or

place orders, for example. Built-in to MS Windows is connectivity to the Internet. The Internet and intranet (internal networks operating under browser software and supporting Internet connections) can improve communications by e-mail, and make common applications and data available to a multitude of users. At the same time, the technologies allow users to tap into selected resources on the Web.(Hill 13)

4) Investment protection

Investment protection means that foodservice providers can leverage their technology purchases today for as long as possible in the future, To ensure that investment protection, vendors need to supply open systems. An open architecture allows the operator to incrementally add components, such as disks, memory, receipt/kitchen printers, kitchen display system, a new processor or even a new PC processor board. However, to provide the greatest, long-term flexibility, any additional peripherals mandate a system built in the "center" of industry standards to ensure a solid, open architecture.

Operators also should look at a POS system that is in accordance with OLE-for-POS, or OPOS, standards. About three years ago a consortium of Microsoft and several large system providers was formed to define standards for retail peripheral interfaces for 32-bit Windows-based POS systems that standard defines the various retail peripheral classes and their associated controls.

The objective of OPOS is eliminates the requirement for application developers to write new and unique interfaces for each peripheral, such as a receipt printer. With OPOS standards, application developers need to write only one interface resulting in significant time and money savings in development, labor and freedom to choose "best-in-class" peripherals is that protect an operator's software investment

5) Linkage

The ability to link POS devices to powerful network topologies has had a significant impact on data consolidation and multiunit communications.

Data-bridges and information gateways are becoming part of the POS vocabulary.

6) Multi-Unit communication

There is an increasing demand for improved electronic mail capability, remote cash register polling techniques, corporate reporting methodology, and facsimile (better known as fax) transmission technology (Kasavana 101, 1989).

Ⅳ. ADVANTAGE

1. Elimination of arithmetic errors

A guest check survey conducted in 1987 revealed that hand-written checks were inaccurate 16 percent of the time : This study concluded that restaurants using hand-written checks have lower tipping and a substantial loss of potential revenue. A POS system would eliminate errors due to miscalculations: this could increase revenues up to 1, 5 percent.

2. Improved guest check control

Guest check control under manual conditions is one of the first items to be neglected. With a POS system, a server must place the order through a server terminal so it is printed in the kitchen or bar. This ensures the recording of all sales. It also electronically tracks open checks, settled checks, voids, comps, discounts, and sales for each server.

3. Increased average guest check

Since orders are transmitted to the kitchen printer, travel time to the kitchen is reduced. This allows more time for suggestive selling and servicing guests. Also, a POS system provides a detailed summary for each server listing average guest check, items sold, and total sales. This information can be used for job evaluations, and motivational programs.

4. Faster reaction to trends

A POS system can provide a wealth of information on real-time basis. Most POS systems can easily track sales and cost information by time period, employee, meal period, register, outlet, table, and menu item. This allows a restaurant operator to quickly spot and react to problematic areas affecting profitability.

5.Reduced labor costs

The implementation of a POS system eliminated much of the paperwork and resulted in a leaner management staff who refocused their efforts on guest related issues. Since cover count information is retained on a hourly basis for each day, managers can use this to sense changes in daily workloads (forecasting) and take the required action (managing). This will help reduce unused labor capacity.

6. Reduced credit card expenses

A few POS vendors now offer a credit card interface. Credit card charges are transmitted at the end of each day for processing. Credit card vouchers no longer have to be submitted by hand. Only one telephone line is needed for

support the POS network. It eliminates bad credit cards, illegible copy, mistake in addition, incorrect credit card numbers and tip recording.

7. Reduced late charges

Ensuring that breakfast charges are posted to a folio before the guest checks out has been a costly problem at many hotel properties. The most effective measure in reducing late charges is to interface POS terminals in the food and beverage outlets with an automated property management system (Collins 36-38).

V. Recent Tool for POS

Technical advances in personal computers have resulted in flexible, standardized applications that can be adapted to diverse food-service operations. Moreover, employees can be taught to use the systems with minimal training. As a result the transaction process in marketplace will soon be dominated by PC-based register (Kasavana 50, 1995)

America's low unemployment rate means it is difficult to find new workers. Turnover in hospitality is high, and training time is an issue. Depending on whose figures, touch-screens are 20 percent to 35 percent faster to learn and to use than keyboards. (Harler)

Recently, touch-screens continue to benefit from refinement and the falling price of computing horsepower. Among the latest development in touch-screen technology is the availability of larger, brighter displays. Several vendors now offer12.1 inch models incorporating brighter, more colorful active- matrix technology. Some fast-food companies are reportedly investigating the use of active-matrix screens because the brighter display makes it easier for shift managers and order expeditors to look over the shoulders of multiple cashiers.

Also relatively new are hand-held touch-screen POS terminals. Touch-screens make portable POS feasible because they make it possible for users to hold the device with one hand while cycling through menu and transaction options with the other hand. (Hotchkiss 51)

As vendors begin to transfer applications to more-standardized platforms, the transaction process in marketplaces will be dominated by PC-based register. Future designs are likely to feature open-architecture, modular configurations, increased settlement functions, and a wireless device. PCR systems, built from redesigned point-of-sale terminals, microprocessors, specialty printers, and other peripherals, are being configured using network technology. In the future, PCR systems will play a major role in transaction processing in the hospitality industry (Kasavana 55, 1995).

The ability to connect several POS devices to a network controller or file server and to have a data-bridge connecting each file server to a local areas network or wide area network for data transfer will continue to be a major development focal point (Kasavana 100, 1991).

Another advanced user interface allows users to handwriting their input rather than type or point and click a mouse. It is called pen-based computing (Kasavana & David 73).

Voice recognition technology is anticipated to play an increasing role in data capture. The implementation of verbal synthesis and recognition may well revolutionize the foodservice landscape. Verbal order entry may also be a technology that looms in the not-to-distant future (Kasavana 66, 1991).

From a software perspective, increased integration and the infusion of artificial intelligence are anticipated. Artificial intelligence software, capable of internally monitoring the linkage between service and production functions, may be able to determine and adjust out-of-balance conditions before they become chaotic (Kasavana 56, 1990).

Ⅵ. Conclusion

As many people are used to handing computers and many restaurants are purchasing a computer system, there appear to be a new trend that "The computer solves every problem in an operation". Few people are in a hurry to buy a POS system without thinking of the restaurant's situation and the weak points of the POS system. So I would like to review several operational problems of the system.

First, we should think about the size of the operation. Obviously, chain restaurants must have excellent systems in order to analyze each report for a management decision that requires large amounts of objective data. But if the business volume is small, management should be careful about choosing and customizing system: such as using a personal computer with the proper accounting program.

Related to beverage control, if business volumes are bigger than the average restaurant and the percentage of drink sales, expect soda, are more than 15$, then they may review the POS order-system. Because the customer's request are very specific in that kind of operation, servers should take more steps to order by computers rather than ordering in person.

Training on the computer system and serving of customer requires a lot of time. Some special concept restaurants, with a higher than average turnover rate of servers, should consider modifying a POS system. One example may be that the cashier is the only person allows using the computer system. This cashier-only system offers the following advantage: reduce the hardware cost, eliminate the server-training, result tighter product and cash control (Collins 42).

Menu diversity is also a big concern about choosing a system. In most of cases, 70% of main dishes are ordered from within 7 items on the menu, and

if that restaurant has limited appetizers and desserts, they will be successful using a POS system. But businesses with diverse menus will confront with difficulties in running the POS system. The input can be complicated by too many variables in a menu. The servers can easily make a mistakes (Engle Interview).

In addition to the day-today challenges that come with running a restaurant, operators are being encouraged to adopt an array of technologies, it is imperative to consider all the needs of customers, store operations and headquarters before making any purchasing decisions.

To best manage the decision process, operators should base their systems on an open PC platform, including both hardware and software architecture. As a result, restaurateurs can focus on key functionality requirements that will run their operation today while providing a long-term migration strategy

POS system is real benefit of modern technology, and it is rapidly developing. But the most important factor is that each manager should consider operation's characters such as menu diversity, volume of sales, turnover rate of server, budget for POS system, and training time. And they should make each POS system meet their own situation and needs.

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Abstracts

식당정보시스템에 관한 연구

Point-of-sale System을 중심으로

유 종 서

컴퓨터의 발전에 따라 식당운영 기법도 많은 영향을 받았다. 오늘날 이러한 많은 변화 중에서 여러 가지의 긍정적인 혜택을 찾아볼 수 있는데 그 중에는 영양분석, 회계, 구매등의 영역에서 여러 가지 발전이 그것이라 할 수 있다.
그러나 모든 컴퓨터 시스템(POS)이 동일한 기능과 잠재성을 가지고 혜택을 주는 것은 아니며 POS 시스템의 구조를 이해하고 발전가능성을 예견하는 것은 매우 중요한 사안이다.
최근의 컴퓨터 환경은 무척 빨리 발전하고 있는데 식당의 운영자에게 중요한 점은 올바른 POS 시스템을 구입하는 것이다. 우리는 이 연구를 통해서 식당의 POS 시스템에 관하여 이해를 하고 향후의 발전 방향을 예측할 수 있을 것이다.

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1999년 12월 27일 최종심사