Chapter 5 Restaurant Technology Systems by DeMicco, Cobanoglu, Dunbar, Grim Property o

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RESTAURANT Technology Systems



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ccording to Brian Sill, principal of Deterministics, a food service management and consulting firm: "To compete effectively in the markets of today, and tomorrow, all stages of the restaurant production and service chain must act in concert, so as to ultimately deliver quality products at the right prices to the right guests at the right times. Failure to do so can result in excess inventory, poor food quality, poor guest service, underutilized capacity, and unnecessary cost. Restaurant technology helps management monitor and coordinate these activities in a more timely and focused manner." Restaurant technology also provides management with the right information at the right time resulting in fewer costly mistakes, better forecasting, higher productivity, and improved marketing know-how.¹ Large volumes of paperwork are replaced with computer generated reports that reveal previously hidden dynamics.²

The Information Age has produced a wave of technological applications, changing the way restaurants process and monitor transactions. Applications covered in this chapter include point-of-sale (POS) systems for table service restaurants, table management systems, home delivery, frequent dining and gift card programs, inventory control systems, and menu management systems.

After completing this chapter, you should be able to:

- Define what Point-of-Sale Systems are.
- Understand the benefits of using technology in a restaurant.
- Explain different POS Terminal Designs.
- Explain the differences between a Handheld POS and a traditional POS.
- Understand the functions of Kitchen Display Systems.
- Understand Menu Management System.

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POINT-OF-SALE SYSTEMS

A POS System, a core foundational application, can enhance decision-making, operational control, guest service, and revenues. However, not all POS systems offer the same features and potential for profit improvement. The purpose of this section is to discuss those factors that are critical to POS system selection for table service restaurants.³

A POS system is a network of cashier and server terminals that typically handles food and beverage orders, transmission of orders to the kitchen and bar, guest-check settlement, timekeeping, and interactive charge posting to guest folios. POS information can also be imported to accounting and food cost/inventory software packages. A variety of reports can be generated including open check (list of outstanding checks), cashier, voids/ comps, sales analysis, menu mix, server sales summary, tip, labor cost, etc. Sophisticated POS systems can generate hundreds of management reports.

Although POS systems are becoming more affordable, they still represent a substantial financial investment. The average cost of a POS system, including installation, is about \$15,000 and must be replaced or upgraded every three to five years. Some restaurant operators spend \$50,000 or more for their POS systems.⁴ Although many claim that a POS system can improve profitability by 20 to 60% with a payback of less than two

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years, a few restaurant operators remain skeptical. Attitudes are changing, however, as POS systems become more robust, flexible, powerful, user-friendly, and cost effective. The disadvantages of standard cash registers compared to POS systems are hard to ignore.

ELIMINATION OF ARITHMETIC ERRORS

1. Elimination of arithmetic errors. A guest-check survey conducted in 1987 revealed that handwritten checks were inaccurate 16% of the time where 70% of these checks averaged a substantial undercharge. Undercharges were brought to the restaurateur's attention 36% of the time as opposed to 91% for overcharges. This study concluded that restaurants using handwritten checks have lower tipping and a substantial loss of potential revenue.⁵ A POS system would eliminate those errors due to miscalculations, which could increase revenues up to 1.5%.

IMPROVED GUEST CHECK CONTROL

2. Improved guest check control. Guest check control under manual conditions is one of the first items to be neglected. Failure to audit missing checks and to reconcile guest check sales with cash register readings often results in a lower sales volume and higher cost ratios. With a POS system, a server must place the order through a server terminal for it to be printed in the kitchen or bar. This ensures the recording of all sales and provides line cooks with legible orders. It also electronically tracks open checks, settled checks, voids, comps, discounts, and sales for each server, as well as employee meals. Consequently, sales abuses associated with manual systems are eliminated without much effort. It also ensures that employee meals, waste, and guest comps are rung up and discounted accordingly.

INCREASED AVERAGE GUEST CHECK

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 (see Figure 5.1). This information can be used for job evaluations, motivational programs (e.g., wine contest), assessing merchandising skills (e.g., average guest check and item sales), and server efficiency (e.g., sales per hour).



FIGURE 5.1 A Partial Server Report

FASTER REACTION TO TRENDS

4. Faster reaction to trends. A POS system can provide a wealth of information on a real-time basis. Most POS systems can easily track sales and cost information by time period (e.g., hour, daily, weekly), employee, meal period, register, outlet, table, and menu item. This allows a restaurant operator to quickly spot and react to problematic areas affecting profitability such as a declining average guest check during lunch, excessive labor hours in the kitchen, a changing menu mix, or sluggish liquor sales. It also enables operators to quickly identify and capitalize on sales trends (e.g., items largely sold at 6:00 PM versus 9:00 PM help chefs create specials tailored to each crowd). Some POS systems provide information on table turnover and utilization. This can be used to evaluate station sizes, dining room table mix, service style, server and kitchen efficiency, and seating and reservation policies.

Unfortunately, many managers rely on profit and loss statements to judge operational performance, which tends to lay blame rather than explaining where and when the mistake was made.⁶

REDUCED LABOR COSTS AND GREATER OPERATIONAL EFFICIENCY

5. Reduced labor costs and greater operational efficiency. In the 1980s, a 140-seat South Florida restaurant with sales in excess of \$4,000,000 was using a mechanical cash register. Managers spent a considerable amount of time auditing guest checks, collecting dups from the kitchen to derive a sales mix and hourly cover count, and closing out the register. 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 an 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.

A POS system can streamline employee tasks to save time and improve productivity. For example, a POS system provides the opportunity to eliminate cashier positions by assigning this responsibility to servers who carry their own personal banks. Combining certain technologies such as wireless handheld order entry systems with kitchen display systems significantly reduces service delays and labor requirements and increases table turnover. The aforementioned technology combination was used to slash at least 20 minutes off the total guest experience and eliminate the need for a window-person dealing with orders entering the kitchen at a busy T.G.I. Friday's restaurant (www.micros.com).

REDUCED CREDIT CARD EXPENSES

6. Reduced card-related expenses. Most POS vendors offer credit (and debit) card interfaces. The server slides the credit cards through magnetic stripe readers attached to the POS terminals which automatically call for authorization, display approval on the screen, and produce checks to be signed. This eliminates the need for stand-alone credit card terminals, which pays for the credit card interface in less than a year in most cases. One telephone line or Internet connection (used for faster credit card processing) is needed to support a POS network. The expense of multiple phone line installations and monthly phone line usage costs is saved. Input errors are virtually eliminated because information does not need to be rekeyed manually. The amount of the sale will always match the amount of the charge on the credit card, which also eliminates the need to go back and match individual sales when the credit card batch does not match credit card sales. Also, when the cashier is overwhelmed with too many credit card approvals, the servers can carry out this task. Furthermore, POS vendors can offer clients very competitive credit card commission rates through arrangements negotiated with banks or financial organizations. Transaction fees are further reduced when restaurants allow customers to pay with debit cards. A recent development is the Mobile Payment System (e.g., Square Wallet). It enables customers to pay with their mobile devices, such as smart phones. This provides the opportunity for operators to streamline payment processes as well as save on credit and debit card transaction costs. On the horizon are **Invisible Payment Systems** that use smart

phone global positioning system technology for detecting a customer's presence. "You can actually walk into a merchant, keep your phone in pocket, keep your wallet in your pocket, and a picture of you pops up on the register. You can just say, T'm Laurie, and I'd like a cappuccino,' and your card is charged in the background" (http://money.cnn.com/2012/08/14/technology/ startups/square-dorsey).

REDUCED LATE CHARGES

7. Reduced late charges. Ensuring that food and beverage charges are posted to a folio before guests check out can be a problem if done manually. The most effective measure at reducing late charges is to interface POS terminals in the food and beverage outlets with an automated property management system. Along with providing timely and accurate charge posting, it checks the status of a guest's room or credit.

AUTOMATED BEVERAGE DISPENSING SYSTEM

American Business Computers manufactures a computerized beverage dispensing system that can dispense over 1,200 different drinks and account for liquor, cocktails, cordials, wine, beer, and soft drinks. It pours a complete drink within two seconds after pressing a preset key or entering a PLU #.

TERMINAL DESIGN VARIES

POS terminals come in different shapes and sizes. However, there are two terminal types. A Server or Precheck 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, pole or customer display, and Magnetic Stripe Reader, an input device that can retrieve information from the magnetic film strip found on the back of credit cards or employee identification cards (see Figure 5.2). Some POS terminals are equipped with Fingerprint Readers. Employees place fingers on a small sensor which authenticates identity and logs them on. These biometric security devices can be used in place of cumbersome passwords or magnetic swipe cards to simplify the logon process and to enhance security measures against fraudulent behavior. The latest development is a POS RFID Reader, which can trigger an automatic logon at a POS station when a server wearing a RFID wristband is within range. The KeyLime Cove Water Resort in Gurnee, Illinois, has deployed an RFID wristband system (another example of a mobile payment system) developed by Precision Dynamics Corporation. It provides customers with automated cashless POS with a simple wave of their wrist. Cash is electronically loaded and deducted on the RFID wristband for instant purchases throughout the resort.

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FIGURE 5.2 Example of POS Device



For inputting orders, there are typically four options: the standard 101-key models found with computers, touch screens, handhelds, and programmable keyboards. **Programmable Keyboards** use touch-sensitive, wet-proof membrane panels where the keys are flat. POS input keys can be classified as:

Preset

1. *Preset*—These keys are identified by item name or icon (e.g., press key titled HAMBURGER to enter order) and also maintain the price.

PRICE LOOK-UP

2. Price look-up (PLU)—The number of preset keys appearing at once is limited by the size of the keyboard or screen. To enter menu items not appearing on the keyboard or screen, enter its PLU # (e.g., enter 113 for LAMB SPECIAL on the numeric keypad).

NUMERIC KEYPAD

3. *Numeric keypad—This* is used for entering PLU numbers and transactions requiring numeric input, such as entering a server number or ordering five steaks.

PAYMENT

4. *Payment*—When settling a check, the cashier can choose from a number of payment keys (e.g., cash, Visa).

COOKING INSTRUCTIONS

5. *Cooking instructions*—These keys are used for preparation instructions to the chef that appear on the kitchen printout.

HARD

6. *Hard*—These keys assist in processing transactions such as void and clear. Unlike the other keys, these keys cannot be reprogrammed.

ITEM RECIPE LOOK-UP

7. *Item recipe look-up*—A bartender can look up drink recipes. A server can look up photographs and ingredients of menu items. Customers increasingly want to know the nutritional value of menu choices. Moreover, servers with convenient access to detailed ingredient information are more likely to advise customers with food allergies correctly.

CUSTOMER LOOK-UP

8. *Customer look-up*—A server can look up information about customers to repeat or modify their past orders (e.g., automatically reorders a round of drinks without having to reorder each drink manually), to learn about their preferences and special needs (e.g., allergic to garlic), and to provide them with rewards updates for those enrolled in a frequent dining program.

When using a touch screen to input orders, the user selects keys by pressing the screen at the appropriate place. This input option is popular due to its flexibility and ease of use. Another input option gaining in popularity are **Mobile POS Devices**, which typically involve a handheld terminal, tablet PC, or smart phone. Mobile restaurant operations, such as food trucks, particularly benefit from Mobile POS systems.

Wireless handheld terminals were first introduced in 1977. Numeric keypads were used to enter PLU numbers and infrared technology to relay this information between the handhelds and POS systems. Later handheld terminals used radio frequencies for transmitting information. Handheld terminals were not popular during the 1970s and 80s. The public did not accept them. At some restaurants, servers were instructed to step away because of customer complaints. Some restaurateurs wanted technology to remain behind the scenes. In addition to negative perceptions, there were other drawbacks. Some servers found the handheld screens difficult to read and to navigate. Unit prices were expensive, and many restaurant operators feared handhelds would be damaged, stolen, or lost. Units sometimes malfunctioned in hot weather or were disrupted by other FM transmitting devices. There were also problems with the recording and timing of orders. However, the current generation of handheld devices, ruggedized and restaurant hardened, have overcome most perception and technical problems and are becoming easier to use. Furthermore, improvements in wireless technology (e.g., RF and Ethernet) have significantly extended the transmission or distance range. Handheld terminals are most commonly used in outdoor recreational areas without electricity, such as resort pools or golf

courses. "Nevertheless, while you will probably find that some bars and restaurants use them for patio dining, they have yet to make major inroads to the main dining room—but that may be changing," according to restaurant veteran Joe Erickson.⁷

Specific benefits include:

- 1. Delivery of food is quicker resulting in higher average checks and greater table turnover.
- 2. Servers have more time for servicing guests and suggestive selling resulting in higher tips and satisfied guests. For example, handhelds at the Oak Forest Bowl in Chicago, Illinois eliminated the need for servers to walk back and forth across a 20,000 square foot beer garden to take and input orders into the POS system. Servers at Washington, D.C.'s Royal Mile Pub use handhelds to quickly list all of the 83 single-malt scotches the restaurant serves.
- **3.** Training time is significantly reduced. With easy access to the menu, including daily specials, server menu knowledge is enhanced and menu memorization reduced.
- 4. Handhelds can be equipped with portable belt printers and credit card swipes for printing customer receipts and performing tableside settlement. This provides quicker service, for curbside and takeout service especially, and also safeguards guests from credit card fraud.
- 5. Handhelds inform the servers when items are out of stock or orders are ready, although this task can also be accomplished through waiter paging systems. Silent (no beeper noise) paging systems are available. Servers receive an unmistakable vibration when an order is ready.
- 6. More tables can be assigned to servers without compromising the service.
- 7. Customer, ingredient, and nutritional information can be accessed easily.
- 8. Errors and omissions due to transferring orders to the POS system are significantly reduced.
- 9. Lines at POS terminals are eliminated.



Handheld terminals are being used more often in different settings.

- 10. The system can prompt a server to read each order back to verify accuracy before hitting send.
- **11.** Hardware-related costs can be reduced. Five fixed POS stations, for example, can be replaced with two fixed stations and eight to ten handhelds, reducing energy consumption. Handhelds may have the capability of texting or emailing receipts, reducing the cost of reordering thermal receipt paper and printers.

Recent developments in handheld ordering systems are write-on handhelds, tablet PCs, (e.g., iPad), and smart phones (e.g., Android). Write-on handhelds, instead of trying to compress touch screen interfaces onto tiny PDA screens, allow servers to simply write the orders down using styluses. Handwritten information is then transformed into menu items using handwriting recognition software. "As the server writes, all items containing the letters or codes he or she has written are displayed in the Selection Window. As soon as the server sees the correct item, he or she may tap it once to add it to the order" (http://www.rmpos.com).

A growing number of operators are using Apple's iPad as part of their POS systems, from arming servers with them to installing them on dining tables. iPad's larger display enables more POS keys to be shown, making it a more attractive sales and information tool.⁸ In a recent survey conducted by Technomic, a food industry consulting and research firm, customers are receptive to trying new restaurant technologies, especially tableside touch screen devices that enable them to self self-order and pay, view menus, and tie in digital rewards with loyalty programs. According to recent studies, tablet menus increase sales in most restaurants. Menu information can be presented in multiple languages. They contain more information than paper menus, offering high-resolution pictures of dishes and easily accessible allergy and nutritional information. In 2012, New York-based OTG equipped tables with self-ordering and payment iPad tablet PCs at five table-service restaurants and common seating areas at JFK, LaGuardia, and Minneapolis-St. Paul airports. According to Rick Blatstein, chief executive of OTG, which operates 150 restaurants, gourmet markets, food courts, and other food service points of distribution at 10 airports, the self-service tablet technology has resulted in a double-digit increase in sales due to faster seat turns, higher average guest checks, and higher levels of service. Servers no longer have the burden of recording and entering order details.

SoftTouch, a restaurant point-of-sale (POS) provider, created a Mobile POS system called DineBlast Mobile used for table service, quick service (QRS), takeout, or curbside ordering. Restaurant diners self-order and self-pay using Wi-Fi (a wireless transmission standard) enabled personal devices (e.g., Palm Treo, Blackberry, iPhone, and iPod Touch). Customers can also page and text servers (e.g., need extra Italian dressing), request drink refills, complete customer satisfaction surveys, and access their order and payment history. A designated printer provides hard copies of receipts customers can sign on their way out (http://www.softtouchpos.com).

In 2007, Microsoft introduced **Pixelsense Computing** (formerly called Surface Computing), an interactive tabletop technology with unique capabilities and possibilities for evolving future dining table experiences. PixelSense computing has four key attributes (www.microsoft.com/surface):

Customers are receptive to trying new restaurant technologies such as tablet menus.



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- 1. *Direct interaction with a touch-sensitive screen*—Users can use their hands to "grab" digital information and to interact with content by touch and gesture without a mouse or keyboard.
- 2. *Multi-touch*—Many points of contact are recognized simultaneously, not just with one finger like on a typical touch screen but up to dozens of items at once.
- 3. *Multi-user*—The horizontal form factor makes it easy for several people to gather around surface computers providing a collaborative, face-to-face computing experience.
- 4. *Object recognition*—Users can place physical objects, such as credit cards or room keys, on the surface to trigger different types of digital responses, including the transfer of digital content.

Sheraton Hotels and Resorts used this expensive technology at five properties to enable guests to order and pay for food and drinks as well as to browse and listen to music, send photos home, download books, etc. PixelSense computing and technologies like it provide a rich platform for future hospitality applications. For example, a "customer simply sets a wine glass on the surface of a smart dining table, a restaurant could provide them with information about the wine they're ordering, pictures of the vineyard it came from and suggested food pairings tailored to that evening's menu. The experience could become completely immersive, letting users access information on the wine-growing region and even look at recommended hotels and plan a trip without leaving the table" (www.microsoft.com).

The following are various criteria for evaluating what POS systems are best for your operation:

1. *How quickly must orders be processed?* To evaluate speed, obtain the time values associated with opening a check, adding items, voiding items, modifying orders, settling the check, and capturing a credit card authorization. For most POS systems it will take 10 to 20 keystrokes to process a typical guest check. The speed at which these keystrokes are executed primarily depends on the responsiveness of the terminal and how quickly a server can identify the required keys.

Look for terminals where descriptions of PLU numbers can be quickly accessed, screen and keyboard layouts are well-organized and not too crowded, and order modifications and substitutions are easily executed. The POS program should enable a server to input the order just as the guest has ordered it without delay (e.g., server looks for a manager to determine whether fries can be substituted with a side salad).

HANDHELD DEVICES CARVE RESTAURANT NICHE

Handheld technology is slowly transforming the restaurant industry and soon the waiter's order pad may become a relic of the past.

-RICHARD WEBSTER (www.qsrweb.com)

- 2. What system provides the most effective interaction? When choosing a POS system, it is important to assess the user's skill level and training needs. Most people feel touch screen systems provide a more natural interaction, making it easier to learn and use. However, experienced, older employees at a busy restaurant might prefer a programmable keyboard. An operation with a high turnover and low literacy may find that keyboard buttons dedicated to the icons of the various products (e.g., hamburger, fries, milk shake) provides the best interaction.⁹ Terminal selection should be based on the needs and quirks of the user. Provide employees with the opportunity to experiment with the POS systems under consideration. Observe their reactions to them, perhaps administering a survey for additional feedback. (See www.ncr.com/products/restaurant/POS/handheld-pos.)
- **3.** *How are menu changes handled?* Restaurants with frequent menu changes would find touch screens easier to manage than flat programmable keyboards, which require typed **Menu Boards** to overlay the keyboard surface for identifying the function of the key. This board must be re-typed when menu items (preset key descriptions) are added, deleted, or changed. A different board may also be required for each new meal period (e.g., breakfast, lunch, and dinner). This might pose a significant problem in a 24-hour operation where meal periods overlap. Another consideration is the reconfiguration of desktop or full-screen menus for mobile POS devices. Client/server applications designed for desktop PC screens usually do not render well on mobile device screens. **Middleware** solutions can be utilized for automatically generating a display or new user interface based on the application and the associated device screen size and type. Middleware is a group of computer routines creating a communications interface between a high level application program and physical hardware. It insulates application programs from the idiosyncrasies of physical devices and provides modularity and portability.¹⁰
- 4. How many preset keys and PLU numbers are needed? It is extremely important that the system can identify every item sold. This allows the restaurateur to easily discern fast and slow moving menu items and to differentiate between desirable and undesirable food cost items for various parts of the day. As a result, menu items with a high percent of sales and low food cost may be promoted. This information is also needed by the back office for calculating standard usages of raw goods for inventory and cost control. POS keys also need to appropriately categorized

or grouped (e.g., Food Sales, Soft Beverage Sales, Liquor Sales, Beer Sales, Wine Sales, etc.) according to industry standards specified in the *Uniform System of Accounts for Restaurants*, a book published by the National Restaurant Association. This enables potential cost issues to be isolated (e.g., liquor cost is measured against liquor sales; wine cost is measured against wine sales, etc.) and allows restaurant operators to gauge their performance compared to others (e.g., XYZ Restaurant: Wine Cost/Wine Sales = 39%; Industry Average = 35%).

5. What should the POS terminal configuration be? Terminal placement and the number of terminals needed primarily depends on the layout of the dining area, volume of business, average length of a transaction, restaurant theme or concept, and terminal size.

The restaurant operator should locate terminals which are easily accessible to servers, minimizing travel and waiting time. A terminal can normally handle three to eight servers. A 40-seat restaurant may require only one terminal. Placing terminals in a large restaurant with several rooms requires careful planning. Vendor recommendations should be carefully considered. They have the sales-driven tendency to recommend more terminals than are actually needed. If placing a terminal in a particular area is questionable, install the necessary communication cables that would allow a terminal, if needed, to be quickly brought online. A spare terminal, for example, could be used in a banquet room that is sometimes used for Sunday brunches.

Terminal visibility or obtrusiveness is another consideration. Exposing terminals to guests may take away from the restaurant's ambiance. POS terminal dimensions vary significantly. Small terminals can be tablesunk, making them virtually transparent to the guest. Bulky terminals are difficult to conceal and are usually found around side stations and back-of-the-house areas. On the other hand, a flat, touch screen terminal can be placed almost anywhere, including being hung from the ceiling or mounted on the wall like a picture.

TECHNOLOGY TIDBITS

In 1992, the first touch-screen handheld was introduced.

Servers or tables equipped with mobile POS devices eliminate terminal placement and capacity considerations. However, wireless technology is not limited to handhelds and portable computers. Full-size terminals are also available.

Wireless POS systems provide the maximum design and redesign flexibility. They enable POS terminals to be placed virtually anywhere and relocated where the employees and customers are in minutes to improve productivity and speed of service at no additional cost. Cost requirements posed by wired installations are also reduced.

ARE SERVER TERMINALS ALWAYS NEEDED?

In some operations, servers never touch a terminal. The cashier is responsible for entering and settling all guest checks. A cashier-only system offers the following advantages:

- **1.** No more than three terminals are needed for most operations, greatly reducing the hardware cost.
- 2. Training servers to operate a POS terminal can be eliminated. Many feel that training is a waste of time in a high turnover industry. This time can be spent on merchandising and service skills.
- 3. Since there are fewer inexperienced users, there are fewer POS problems.
- 4. Tighter product and cash control results.

Choosing a cashier-only POS system may be an appealing option, particularly for smaller operations (annual sales less than \$1,000,000) with limited resources and a compact dining room layout.

Technology is finding its place at the restaurant table, according to the National Restaurant Association's 2012 Restaurant Industry Forecast. Nearly 4 in 10 consumers say they would likely use an electronic ordering system and menus on tablet computers at table service restaurants. About half said they would use at-table electronic payment options and a restaurant's smart phone app to view menus and make reservations. At quick service restaurants, about 4 out of 10 consumers say they would place online orders for takeout, use in-store self-service ordering kiosks, and use smart phone apps to look at menus and order delivery (www.restaurant.org).

POS PRINTERS

When selecting printers, noise, speed, reliability, special features, and costs must be considered. **POS printers** produce credit card slips and receipts for customers and order slips for the kitchen and bar staff.

Dot matrix and thermal are two commonly used slip and receipt printers. A dot matrix printer is an impact printer that forms text by pressing the ends of pins against a ribbon. A thermal printer is a non impact printer that forms an image by moving heated styluses over specially treated paper. Both of these printers use continuous roll paper.

Dot matrix printers typically cost \$200 to \$400 and are more appropriate for use in the kitchens where the ambient temperatures are enough sometimes to prevent thermal printers from working effectively. Thermal printers typically cost \$100 to \$500. They are better suited for printing credit slips and receipts, and the only option for tableside printing. Fewer moving parts make them quieter, faster, and more reliable than dot matrix printers. The cost of thermal paper is roughly equivalent to the cost of paper and ribbons for dot matrix printers.

POS printers produce credit card slips and receipts for customers.



Order items can be routed to different printers. For example, hot food items can be directed to the hot food prep station and drinks to the bar or drink prep station. One kitchen printer will probably be sufficient for most restaurants. If a restaurant, however, has different stations which handle different dishes, a printer for each station may be preferable if it enables employees to more easily keep up with and time the items for which they are responsible.

Kitchen printers should be compact, allowing them to be placed in areas that are easily accessible without occupying valuable space. Order slips should remain partially attached to each other before being separated to keep them from getting lost and out of sequence.

Order slips should be easy-to-read. There should be ample spacing between lines and clear and adequate menu descriptions (at least 16 characters) that can be read from a distance. Character size is a primary concern. Orders can also be printed in two colors, which is useful in highlighting preparation instructions.

The system should also inform the user when a printer problem exists. Common problems include running out of paper and printer jams. If a printer should jam, order slips and paper guest checks should be redirected to another printer. It is important that printers have sufficient paper to accommodate peak periods and to replace ribbons before the print becomes too light or illegible. The author witnessed pure chaos when a kitchen printer stopped printing food orders during the middle of a meal period due to a paper outage. Some printers have sensors that sound warnings when paper is out or nearly out.

Among POS components, printers have the highest failure rate because they have the most moving parts. Consequently, some restaurant operators own spare backup printers.

COURSE FIRING

Course Firing (Hold and Fire) allows servers to place entire orders, after which the system sends the different courses of the orders to the kitchen printer at time intervals selected by the servers or requested by the customers (e.g., bring out appetizer with entrée). Course firing is particularly helpful in placing hotel room service breakfasts, typically ordered via doorknob cards. After the cards are collected in the early morning, the orders are first entered into the POS system and then printed in the kitchen automatically at the appropriate time. Not only does this save time, it also enables the kitchen staff to review all the pre-entered orders when they arrive to quickly gain a sense of the morning's workload.

VIDEO MONITOR OR KITCHEN DISPLAY SYSTEMS

Video monitors are typically used in quick-service and high-volume restaurants to expedite preparation and tracking of orders. Orders placed through POS terminals appear on a kitchen video monitor and can be routed to one or more displays, with the ability to route items based on sale type. The display sequence may be based on a certain priority, such as preparation time. In addition, the display screen can be customized to help kitchen employees time the preparation of food orders (e.g., cold food orders appear blue) and to identify special cooking instructions (e.g., "No Salt" blinks). When the order is ready, it is cleared from the screen by pressing a "bump" bar. Video monitors are also gaining acceptance in the mainstream table service environment, especially as an aid to expediting orders quickly and efficiently.¹¹

Today, restaurant operators can purchase surveillance systems displaying POS data atop normal video pictures. This is done with video technology called text insertion. Any data entered via the POS keyboard will appear on the video monitor. The combination of visual and textual data is help-ful in spotting theft and fraudulent transactions involving no-sales, voids, discounts, excessive sales amounts, etc. For example, if the surveillance system shows a bartender handing out three beers, the sale of those three beers must appear on the screen for it to be a legitimate transaction. Video surveillance systems can also be used to help train employees by monitoring their actions and watching what new menu items are purchased and if employees are making menu items properly and safely. For example, Vision Enabled Training from Elmwood Park, N.J.-based Sealed Air pairs advanced algorithms with high-quality cameras to record employees in food preparation areas and to detect any noncompliance with health regulations and safety codes.

HARDWARE PLATFORMS

The widespread adoption of standard personal computer architecture signifies the beginning of the end for proprietary POS systems. POS systems built on personal computer (PC) platforms provide management with greater software portability, enhanced internal controls and transaction processing technology as well as improved report generation. PC-based POS systems are also more robust with the capability of connecting any type of peripheral from smart card readers to biometric scanning devices.

POS systems are manufactured and serviced by a range of firms and run on a range of operating systems, including DOS, Windows, Linux, and Unix. Most restaurant operators have POS software running on Windows-based networked systems. Small installations run peer-to-peer local networks and larger installations incorporate a dedicated server. In a cloud- or web-based POS network, the server is located offsite. The Internet is used to collect data from POS terminals and to transfer it to a remote server. Restaurant POS terminals will continue to function if the Internet connection is lost. Data will be available once the Internet connection is restored. A cloud-based POS network offers a restaurateur, especially with multiple locations, a number of benefits. Onsite server support tasks are eliminated. The analysis of data across outlets is simplified because the data is stored in a single database. Price and menu changes, employee schedules, and product orders are easily made and can be applied to a single restaurant or an entire chain. With a Web connection, employees can check work schedules anywhere. Owners and managers can access up-to-the-minute information (e.g., sales, labor, and promotions) about their operations anytime. Business intelligence capabilities are improved. Trends can be spotted immediately and acted upon enterprise-wide. Another significant advantage of cloud-based POS systems is interconnectivity with customer mobile devices. They make it convenient for customers to order, pay, and participate in loyalty programs using their own smart phones or tablets.

Advancements in POS software design and user interfaces have resulted in shorter learning curves and offer a number of possibilities for improving employee effectiveness and efficiency. Order entry screens have become more informative and easier to use. Colorful graphical icons can replace character-based computer functions (e.g., selection of a hamburger by touching an icon). A Windows-based POS system, for example, allows servers to view the dining room layout graphically, displaying the location of station and table assignments. In addition, it enables the attachment of photos and video as well as animation clips for such things as online promotions (e.g., picture of chef special) and training (e.g., video clip of how to make a Vodka Martini).

SYSTEM EVALUATION BEGINS WITH A DETAILED CHECKLIST

The basic functionality of POS software does not vary much from one package to the next. However, as more features are added, the software becomes more complex and expensive. It is important to devise a detailed list of all the things you want a POS to do. Without clearly defining selection criteria, it is difficult to differentiate POS products.

The next step is to test the POS System to validate performance capabilities and evaluate ease of use. How certain tasks are handled may make a difference in system selection. Providing more than one check per table, for example, is much easier if the system tracks orders by seat number rather than by check or table number. Such a system can generate a soft check for each seat, any combination of

seats, or the entire table without any additional steps and check responsibility. It might also have the capability of splitting the cost of any item on the menu between two or more customers.

It is important to investigate what systems a POS system can be interfaced with and whether it is compatible with existing systems. The best POS systems can communicate data to a variety of third-party software programs (e.g., payroll, food and beverage, front office). Avoid POS systems with limited interface options; otherwise, an operator may not be able to take advantage of applications which can reduce data entry, improve efficiency, and provide meaningful information.

There should be controlled access to the system. This can be achieved through passwords, electronic key locks, magnetic cards, or fingerprint and RFID readers. This prevents unauthorized employees from performing supervisory tasks such as making changes to the database, opening and closing servers, adjusting checks and punch-in and punch-out times, etc.

The POS payment application and debit card personal identification number (PIN) device must be compliant with the Payment Card Industry Data Security Standard (PCI-DSS—Chapter 2 for more information), which contains a set of regulations or rules developed jointly by the leading card companies (e.g., American Express, Visa, MasterCard, etc.) to prevent cardholder data theft and to combat debit and credit card fraud. Restaurants regained the title as the most breached industry—representing 57% of the investigations according to the 2011 Global Security Report authored by Trustwave, a provider of on-demand data security and payment card industry compliance management solutions. Many restaurateurs do not understand the magnitude of this problem. It takes one card breach to potentially put a restaurant out of business. Restaurants are frequently targeted by organized thieves because of the high volume of card transactions and the low level of security in place. The threats of theft are increasing as sophisticated techniques to hack into systems evolve. Expert assistance is often needed to identify appropriate tools and services to achieve compliance. An owner of a restaurant, for example, assumed that a new POS system safeguarded the operation from a security breach until it was hacked and the affected parties started demanding make-good payments. Unfortunately, the restaurant had to close because of hundreds of thousands of fines and fees.

Also be sure to safeguard the system against power fluctuations. The system should be equipped with an uninterruptible power supply (UPS) where electric lines are supplied directly to the POS network from the building transformer. This minimizes electric noise in the power supply circuit, which can cause garbled transactions, scrambled memory, device failures, and downtime.

Selecting the right POS system can significantly improve accounting controls, efficiency, and profitability. However, the wrong system can be disruptive and a constant source of frustration.

TABLE MANAGEMENT SYSTEMS AND HOME DELIVERY SOFTWARE

Table management systems. Some POS systems provide table-management functions or can be integrated to dedicated table management systems for selected tasks. **Table management systems** reduce guests' waits, improve service, drive revenue through online bookings, and increase turns

by lowering the number of decisions a host or hostess must make, balancing server workloads, shortening the time a table sits empty between the departure of the last party and the arrival of the next, and improving communication between employees and between employees and guests. Tasks performed by table management systems include:

RESERVATIONS PROCESSING AND WAIT LIST MANAGEMENT

A table management system can keep track of all call-in and walk-in reservations and project the waiting time based on the desired seating time (e.g., 90 minutes) and current table status information. A computer monitor located at the host station can graphically display which tables are occupied, reserved, or vacant and whether a table has been bussed or its check has been open, printed, or paid. This information enables tables to be seated more quickly since a host or hostess does not have to walk the floor to determine table status and helps predict when a particular table might become available. It can also identify which tables have been seated longer than the desired seating time, triggering an appropriate tactical response to turn the table. For example, a couple who have finished their dinner and are enjoying a lingering conversation could be gently persuaded to leave their table by having the restaurant manager invite them for complimentary after-dinner drinks in the restaurant's lounge. Sophisticated table management systems can handle group and private room reservations. They may also be able to accommodate multiple locations and to check availability across multiple outlets within the same operation as well as transfer reservations from one outlet to another. (See: www.opentable.com for examples of this table management software.)

TABLE ASSIGNMENTS AND BALANCING

Evenly distributing server workloads is extremely important in achieving the desired throughput and service quality. Triple seating a server, for example, cannot happen with a table management system because it automatically assigns each server station with the same number of guests and tables and auto matically matches a guest's seating preference to an appropriate table (e.g., 4-top in nonsmoking section).

RESTAURANT-WIDE COMMUNICATION NETWORK

Table management systems use Internet links, pagers, video monitors, NETWORK hardwired or wireless transmitters, personal keypads, and mobile devices to electronically link key communication processes found in the service cycle:

1. *Reservation taking*. A table management system can be linked to an online **restaurant reservation system** enabling customers to book tables, place waitlist requests, and access wait times via mobile or desktop devices. It may also enable customers to select tables of their choice, preorder, share table-booking information with others, and send booking reminders through email and text messages. A table management system can also be interfaced with a **caller identification system** for immediately recognizing existing customers when they call and automatically populating reservations with their contact information.

- 2. Guest greeting and waitlist management. Handhelds permit greeters to compile and manage waitlists away from the host terminal. The GuestBridge table management system (acquired by OpenTable in 2009) can instantly recognize guests carrying RFID-enabled Guestbridge VIP/ ID cards. The VIP card is recognized by antennae placed at the entryway. When a VIP arrives, the software immediately displays the guest record to the host stand and/or wireless handheld devices. "This enables staff to greet guests by name before they even have to speak, and their favorite drink can be waiting for them at their favorite table" (www.guestbridge.com).
- 3. Table and wait alert. When a hostess selects a waiting party, the software automatically notifies guests through mobile phones, pagers (e.g., coaster blinks and vibrates), or a video messaging center, a guest-facing display that can also show the waitlist. NoWait, an iPad waitlist app, for example, sends a text message with the wait to the customer's cell phone until their table is ready. Those with smart phones can also click on a link for information about their place in line. A wait alert pager, if equipped with an LCD display, can also provide automatic updated wait times to waiting guests (e.g., your table will be ready in 10 minutes). When a waiting guest is approaching or has exceeded the quoted waiting time, the system can also automatically make the party name flash on the waitlist. Some restaurant operators feel that guests are willing to wait longer if the wait process is fair and they can see progress being made.
- 4. *Table seating*. When the host touches the picture of the table on the floor plan, the server is paged to alert him that a new table has been seated in his assigned station.
- 5. Table service. Guests can page servers.
- 6. Table delivery and order pickup. The kitchen can page servers when their food orders are ready to deliver. RFID location tracking technology can be used to identify where to deliver the food in self-service restaurants. For example, at Panera Bread, a fast food bakery chain, a customer receives a coaster after ordering, finds a place to sit, and then places the coaster on the table. The coaster recognizes an RFID tag underneath the table and then transmits this information back to the kitchen so staff can instantly correlate the food order to a table. Another approach is to provide customers with handheld pagers so they can be summoned to pick up their orders, which Cosi, a fast casual restaurant chain, uses in its higher-volume stores to save the time employees formerly spent walking around the dining room calling out ticket numbers.
- 7. *Table status*. Using a keypad or a handheld or wearable (e.g.,watch) device, a busser can change the status of a vacated but dirty table to vacant and clean.

CUSTOMER RELATIONSHIP AND MARKETING MANAGEMENT

Table management systems capture valuable information about customers, such as contact information (e.g., email and mailing addresses and cell phone number), important dates, (e.g., birthday), historical data (e.g., past wait times, number of prior and future dining reservations booked, and number of no shows and cancelled dining reservations) and preferences (e.g., favorite table and server). This information is used for marketing to conduct an email or direct mail promotional campaigns and to personalize future customer visits. One system, for example, generates slips containing key information about customers. These slips are used by servers to greet guests by name and to know their preferences, past histories, and dietary restrictions. Table management systems can also track referrals and establish incentive programs for concierges. The online restaurant reservation feature also helps create an online presence by providing useful restaurant information, such as location and driving instructions (e.g., Google map), customer reviews, pictures, and menus.

DETAILED SERVICE ANALYSIS

Table management systems are most appropriate for high volume restaurants with multiple dining rooms or dining rooms with obstructions that prevent a clear view from one vantage point. In addition to handling reservations and table-related activities, they can provide information on table turnover and utilization, average wait time, average seating time, number of guests served, etc. This can be used to evaluate station sizes, dining room table mix, server and kitchen efficiency, and seating and reservation policies. (See: opentable.com and www.youtube.comwatch?v=1fuUP_avwuY for examples.)

HOME DELIVERY SOFTWARE

Delivery options are no longer limited to pizza and Chinese food. Although home delivery has been around for a while in the fast food arena, it is becoming more prevalent in table service restaurants. **Home delivery software** addresses the growing outside delivery market by providing restaurants with easy access to the repeat customer's order history: address, directions to home, phone numbers, past orders, etc. When orders are phoned in, the user simply enters the caller's phone number and the caller's name and address appear on the screen. The order is entered and then printed in the kitchen. Features such as one-touch ordering, which automatically enters a past customer order, and suggestive selling prompts (e.g., try our new chicken wings) enhance the ordering process. Home delivery software can improve delivery times and driver productivity by tracking delivery driver production, efficiently routing drivers to minimize drive time, and printing street maps that highlight routes and optional turn-by-turn directions. The delivery receipt or label also has delivery in structions and any useful information about the customer's location, such as "the door is on the left side of the building." Home delivery software also can be integrated with a caller identification

Customers can now track exactly when their pizzas will be delivered.



system. This feature saves time by immediately identifying repeat customers and bringing up their previous ordering information.

Many customers prefer to order online or with a mobile application. For example, online ordering is available at all Domino's and Papa John's pizza restaurants across the nation. "Customers like the system because they can see the restaurant's entire menu and review it at their own pace, allowing them to feel in control of the ordering process" (www.crmdaily.com). Domino's now uses pizza tracking technology to keep the customers better informed. When customers place an order at Domino's, they can go to www.dominos.com and click on the Pizza Tracker icon. They will see a horizontal bar that lights up red as each step in the process is completed. Customers will see confirmation of their order being received by the store and when it is being prepared, baked, boxed, or en route. The Andromeda POS system uses a more sophisticated GPS-based tracking program, which allows customers to track on an online map exactly where the pizzas are. Customers are also automatically notified via text when their deliveries are en route and the estimated time of arrival.

FREQUENT DINING AND GIFT CARD PROGRAMS

The purpose of frequent dining programs is to create and maintain customer loyalty while increasing revenue. Such programs play a major role in customer relationship management (CRM). Frequent dining programs, similar to frequent buyer and flyer-miles programs, reward return customers with points, which can later be exchanged for free desserts, half price specials, or dollars off their meals. Restaurants typically issue frequent diners membership cards that are swiped at POS terminals to track transactions. POS systems make frequent diner programs available to small restaurants, which in the past have been the domain of large chains. Restaurants can award points based on the number of visits, the menu items purchased, or the item dollar amounts. For example, higher point values could be assigned to low-performing or high-profit items to give them a boost. Frequent dining programs enable customer purchasing behaviors to be monitored and analyzed. This information can be used to influence the purchasing habits of customers. Customers, for example, who rarely order takeout food can be targeted with a takeout promotion. This information also enables the tracking of frequent diner complaints and the issuing of customized coupons prompted by specific complaint reasons. Charlie Brown's Steakhouses, the largest steakhouse chain in New Jersey, has a successful frequent dining program providing members with the following benefits (www.charliebrowns.com):

- Two \$10 vouchers for 300 accumulated points. Members, who earn one point for every dollar spent, can access their accounts online.
- Free gifts for active members on birthdays and anniversaries.
- Triple points all day on Mondays at all locations.
- Exclusive members-only offers and events.

Frequent dining or loyalty programs have flourished, increasingly migrated to online media, and become more creative. Chipotle's program (called Farm Team) rewards participants based on their knowledge of its food. Farm Team members access a special Chipotle website to learn where Chipotle's food comes from, take quizzes and polls, play games, and watch videos about the company. As customers make their way through the Farm Team site to different levels they earn points, which they can exchange for food and other prizes. Customers of Menchie's Frozen Yogurt can sign up for its new mySmileage reward program at menchies.com, through Facebook or Twitter, or in-store with a mobile phone number, then pick up a mySmileage wallet and keychain cards in-store. Members earn one "Smile" for every dollar spent at Menchie's. Menchie's automatically loads \$5 in "Menchie's money" onto the mySmileage card each time a customer earns 50 Smiles.¹²

GIFT CARDS

Many POS systems have **gift card** modules to track gift cards and certificate sales to ensure that they are being sold and redeemed securely and correctly. Cards are swiped at POS terminals for card issuances, transactions, and balance inquiries. Some POS systems provide customers with online access to gift card balances. Key benefits of gift card programs are advanced cash flow, increased sales, new customers, the frequency and nature of customer transactions are tracked, a higher profit margin because not all gift cards are redeemed, and the refilling and reusing of them by customers. Starbucks, the specialty coffee retailer, has benefited greatly from its gift card program, which accounts for 10% of all transactions. Furthermore, over a third are being refilled and reused because it saves customers time in line, since swiping gift cards speeds the transaction process. Starbucks gift cards can also be loaded onto the Starbucks mobile app for even a faster checkout. To pay for a beverage, for example, the customer holds the bar code appearing on the smart phone for the selected card up to the 2D scanner, and the purchase will be deducted from the balance.

GETTING **B**ACK TO **B**ASICS

As successful operators have always known, the basic disciplines make more money for a food service operation than any system, manual or automated, ever could. And two of these two basic disciplines are inventory and receiving. In many cases, a reduction of 2-3% of sales can be accomplished by tightening up on the basic disciplines of inventory and receiving.

Three basic rules seem to work every time for operators who want to reduce food costs substantially.

- 1. Increase the frequency of taking inventory.
- 2. Reduce the level of inventory.
- 3. Receive goods like a fanatic.

—The Food Tracker, A Food Cost Management Newsletter by System Concepts, Inc., First Quarter, 1990

INVENTORY CONTROL SYSTEM

An **inventory control system** tracks product quantities and prices and provides accurate information on inventory activities in a timely manner, enabling management to better control food costs. Also, the system makes taking and extending inventories and ordering and receiving easier. The following paragraphs discuss the mechanics involved in constructing and operating an inventory control system.

CREATE VENDOR AND PRODUCT FILES

STEP 1. CREATE A VENDOR AND PRODUCT FILE. Each vendor and product is assigned a number for tracking purposes including work in process (e.g., tuna salad). A vendor file usually contains the name, address, telephone number, and contact person for each vendor. A product file usually contains the vendor identification, product code, product description, product brand, inventory unit (e.g., bag, case) inventory location, and general ledger account number for each product. To save time, inventory items and prices can be imported from a food distributor order guide (e.g., Shamrock Foods).

DESIGN INVENTORY WORKSHEETS

STEP 2. DESIGN AN INVENTORY WORKSHEET. The order of the items on the worksheet should reflect the sequence of items on shelves to expedite inventory taking.

TAKE INVENTORY

STEP 3. TAKE INVENTORY. If the International Foodservice Distributors Association (IFDA) makes bar code labels a mandatory field, use of handheld bar code readers for inventory taking could become wide spread, eliminating inventory worksheets and greatly reducing inventory time.

Using handheld devices, such as Palms, equipped with scanners make taking inventory easier, quicker, and more accurate. Information is downloaded to the handheld from the inventory control system and can be organized by storage location (e.g., freezer, dry storage, prep walk-in). Inventory items are called up by entering a product name or index number, scanning the product bar codes or UPCs, or by pressing the "next" key if following the inventory sequences established in the inventory control system. The inventory control software may also be capable of generating bar code labels for products without manufacturer bar codes. In addition to inventory counting, handhelds can also be used for orders, transfers, requisitions, receiving, and more.

Handhelds are also used for taking liquor inventory. There are three common methods for estimating what is left in a partial bottle. The "tenth" method basically has the employee eyeball the bottle and estimate, to the tenth, how much is left. The second method has the employee scan the product's bar code or UPC and then the handheld displays a silhouette of the brand's bottle. The employee draws a line with a stylus indicating the level of alcohol left inside. The third method has the employee scan the product's bar code and then place the bottle on a digital scale. The net weight is sent automatically to the handheld through a wired or wireless link. Partial liquor inventory information, however, can be automatically accessed through a **wireless free-pour system**, in which each bottle spout contains a unique microchip that transmits pour data to a computer via radio frequency. This type of system is also capable of tracking who's pouring what and when as well as the cost of the liquor served. It can also be linked to handhelds located in the bar areas to provide immediate feedback about each drink poured. This information can help bartenders to learn and maintain pouring accuracy and a proper pouring style. Management can also use handhelds to access real-time reports to identify and resolve problems, including graphics that show the current liquor level of any bottle.

Radio-Frequency Identification (RFID) tags or electronic labels could eventually replace bar code labels. RFID technology uses wireless communication in radio frequency bands to transmit data from tags (microchips) to readers to automatically identify objects with RFID tags attached. Tagging inventory items could automate most inventory counting tasks, as well as streamline workflows involved in the ordering, receiving, production, and selling of food and beverage products.

The Blue C Sushi restaurant in Seattle, Washington, deployed an RFID system to improve both inventory management and customer service. Blue C Sushi serves sushi on plates that are placed on a

conveyor belt that travels around the restaurant. Customers remove the plates of sushi that they want to eat. The restaurant previously used a bar code system where the bottom of each sushi plate was labeled with a bar code, enabling the restaurant to track when plates were added to the conveyor belt and when they were removed by customers. The RFID system, which uses specially designed RFID tags to withstand high-temperature dishwashing and harsh cleaning chemicals, provides far more information, including what type of sushi is on a plate and which chef prepared it, how long each plate has been on the conveyor, and which types of sushi inventory are running low. Chefs access this information in real-time from touch screen workstations to determine which sushi to prepare next to avoid making items that will not be eaten and to ensure the availability of items desired by customers. "It can also determine the sale patterns of its menu items according to the time of day or day of the week, which allows it to better plan inventory purchasing quantities and schedules. The improved purchasing has enabled the restaurant to pare down its sushi suppliers to one and reduced wasted sushi by avoiding over-orders" (www.rfidupdate.com).

At the Cheeky, a Latino restaurant in Georgia, customers use RFID-enabled cards to pour their own glasses of beer (restricted to 40 ounces) from a wall of eight beer taps and then pay the exact amount consumed. This self-serve beer system monitors and accurately records every ounce of beer that is dispensed, eliminating issues of spillage, theft, giveaways, and over pouring and significantly increasing the number of beers served per keg.

PRINT REPORTS

STEP 4. PRINT REPORTS. Various meaningful reports are produced by inventory control systems.

INVENTORY EXTENSION REPORT

• An Inventory Extension Report contains the value of the inventory on hand. Inventory adjustments can be automatically posted to the general ledger if the two systems are interfaced.

FOOD USAGE REPORT

A Food Usage Report shows the food cost, food cost percentage, purchases, inventory, sales, and customer count and may highlight those food items which varied the most from their historical average usage. Significant changes in product usage may indicate poor portion control, pilferage, spoilage, or the need to adjust inventory levels because of a decrease or increase in product demand.

REORDER QUANTITY REPORT

A Reorder Quantity Report suggests reorder levels based upon forecasted sales, par levels, minimum and maximum order quantities, lead time, and historical usage statistics. An accurate purchase order prevents waste and having too much cash tied up in slow selling items, and guarantees that popular menu items will be available.

PURCHASE ORDER

 A Purchase Order itemizes all products on order from a vendor, indicates the order and tentative receiving date, and projects invoice costs for the order. This minimizes misunderstandings and reduces ordering mistakes.

It is a good control procedure to obtain price quotations from three purveyors for each food item, although a shortage of local purveyors might make this impossible.

—JAMES KEISER AND ELMER KALLO, CONTROLLING AND ANALYZING COSTS IN FOOD SERVICE OPERATION

BIDDING MODULE

Adding a **Bidding Module** to an inventory control system helps management identify the most economical products adhering to purchase specifications. It stores price bids that management will review when selecting vendors for purchases. The Food-Trak System by Phoenix-based System Concepts, Inc., for example, enables vendors to submit bids via a Web portal and can place an item on a purchase order automatically for the vendor offering the best price.

Purchase orders can be sent electronically to food distributors across private or public networks. Online purchasing or **e-procurement** can save time, reduce paperwork, improve supplier integrity, drive both buyer and supplier compliance, and lower transaction costs. It also enables a restaurant to route purchase orders for approval and to inquire about product prices as well as availability and order status.

Receiving Report

• A Receiving Report, which identifies all products received and discrepancies between quantities ordered and received, is used to ensure that accurate invoices are inputted into the accounts payable module.

Discrepancies requiring the invoice amount to be adjusted include price and quantity errors (e.g., three cases of ribs are denoted on invoice but only two cases are received in shipment), damaged goods (e.g., jelly jar is broken during shipping), incorrect items (e.g., 24 loaves of French bread are ordered but 24 loaves of rye bread are received in shipment), and extension errors (e.g., 10 bags of cabbage with a unit price of \$7.95 is incorrectly invoiced at \$87.45).

In a fully integrated restaurant management system, data reflected in the receiving report updates accounts payable invoice information, inventory quantities and costs, and recipe ingredient costs found in the menu management system.

MENU MANAGEMENT SYSTEM

A Menu Management System enables a restaurant operator to price, control, and monitor the entire menu. It provides the operator with a detailed item analysis and insight into what inventory

usage and cost of sales should be. The following paragraphs discuss the mechanics involved in constructing and operating a menu management system.

In order to track menu item costs, it is necessary to create ingredient, recipe, and menu item files. Nutritional values and allergens provided by the restaurant operator and/or U.S. Department of Agriculture can be entered for raw ingredients to automatically generate nutritional and allergen information for recipes and menus, which can be printed (e.g., fact sheet, label) or viewed (e.g., POS terminal, website). In March 2010, Congress passed a national law requiring chain restaurants with 20 or more outlets to list calories and other nutrition information on menus and menu boards.

CREATE INGREDIENT FILES

STEP 1. CREATE AN INGREDIENT FILE. Every ingredient used in menu items must be inputted into the system. To reduce data entry, menu management systems may have a preloaded database so that it will not take extra time to input every ingredient into the system.

Information inputted into the **ingredient file** typically includes:

- Ingredient description (e.g., bacon)
- Unit description and cost (e.g., case, cost per case = \$144.00)
- Portions per unit (e.g., 480 bacon slices per case)
- Portion cost (e.g., \$.30 per bacon slice)

The ingredient file must be complete before entering data for recipes.

Recipes are the backbone of the operation. For most operations, every operating expense, every salary and wage, and every penny of profit must come from the difference between the selling price and the cost of recipes. —WILLIAM SCHWARTZ, PRESIDENT OF SYSTEM CONCEPTS

CREATE RECIPE FILES

STEP 2. CREATE A RECIPE FILE. All recipes are stored in the **recipe file**. A recipe lists the ingredients along with preparation procedures (text, audio, photo, and/or video) to help maintain consistent food quality. Recipes can be quickly resized (e.g., increase portions from 50 to 100) automatically adjusting the ingredient quantities and costs.

Menu management systems allow for the creation of **subrecipes**, recipes placed inside other recipes, to make the construction of complex recipes easier.

Information typically inputted into the recipe file includes (See Figure 5.3):

Ingredients	Quantity Used	Portion Cost	Total Cost
Mayonnaise	160 OZ	.026	4.16
Tomato Puree	50 OZ	.029	1.45
Pickle Relish	32 OZ	.029	.93
Freeze Dried Chives	16 TSP	.049	.79
Onion	12 OZ	.020	.24
		TOTAL BATCH COST	\$ 7.57
		COST PER OUNCE	\$.033
Servings per Batch	= 116		
Serving Size	= 2 oz.		
Portioning Tool	= 2 oz Ladle		
Cost per Serving	= .066		
Price per Serving	= .85		
Food Cost Percentage	= 7.76%		

FIGURE 5.3 Recipe Example

- Recipe description.
- Cost and quantity of ingredients used.
- Serving weight after processing. This reflects the shrinkage and evaporation factor in a recipe.
- Recipe or batch cost.
- Servings per batch.
- Portioning tool.
- Serving portion.
- Serving portion cost and selling price.
- Cost as a percentage of price.

CREATE MENU ITEM FILES

STEP 3. CREATE A MENU ITEM FILE. After the recipe file is complete, the final step is to set up the **menu item file**. Information inputted into the menu item file typically includes:

- Category description (e.g., Breakfast)
- Menu item description (e.g., Two eggs, bacon, and potatoes)
- Serving price (e.g., \$6.95)
- Accepted food cost percentage (e.g., 33%)
- Actual food cost percentage (e.g., 35.25%)
- Ingredients. Figure 5.4 shows the ingredients found in a breakfast menu item.

TWO EGGS, BACON AND F	POTATOES		
Ingredients	Quantity Used	Portion Cost	Total Cost
Eggs	2.00 EGGS	.16	.32
Oranges	1.00 SLICE	.05	.05
Jelly	1.00 PACKET	.20	.20
Whipped Margarine	.50 OZ	.10	.05
Coffee	20.00 OZ	.04	.80
Toast	.20 OZ	.037	.01
Half and Half	1.00 CREAMER	.10	.10
Sugar Packets	2.00 PACKETS	.05	.10
Bacon	2.00 SLICES	.30	.60
Parsley	1.00 SPRIG	.03	.03
Grill Shortening	.20 OZ	.052	.01
Potatoes	4.00 OZ	.045	.18
	TOTAL COST FOR MENU ITEM		2.45

FIGURE 5.4 Menu Item Ingredients

POST QUANTITIES SOLD AND GENERATE MENU ANALYSIS REPORTS

STEP 4. POST QUANTITIES SOLD AND GENERATE MENU ANALYSIS REPORTS. At the end of each day's activities, the quantity of each menu item sold is manually or automatically (if interfaced to the POS system) entered into the menu management system to calculate theoretical usages of all inventoried products and to generate various reports evaluating menu and cost control performance.

PRODUCT COST OR MENU MIX REPORTS

A **Product Cost or Menu Mix Report** contains the selling price, the ideal cost (recipe X quantity sold), the food cost percentage, the percentage of total sales, and the gross contribution margin (sales less food cost) for each menu item. This information is helpful in analyzing profitability, food costs, customer preference, menu structure, trends, promotion effectiveness, product performance, and contribution. Menu items on this report may be ranked according to their contribution to profits, enabling management to discern desirable and undesirable menu items quickly.

Theoretical Usage Report Example									
ltem	Unit	Unit Cost	Actual Usage	Actual Usage Cost	ldeal Usage	ldeal Usage Cost	Variance Quantity	Variance Cost	Variance %
Apple	Each	\$.54	20.00	\$10.80	13.00	\$7.02	-7.00	-\$3.78	-0.03%
Bran	Each	\$.47	15.00	\$7.08	19.00	\$8.96	4.00	\$1.89	.0.02%

Probably the most important concept with a menu is the menu mix. The more items on the menu, the more difficult it is to monitor the overall menu pricing. The goal is to determine the correct mix of meals which will yield the highest profits. While you must sell what the customers want, you need to provide these items at the most advantageous price.

–William A. Oleksinski, Jr. and Michael G. Oleksinski, P.C. *Foodservice Spreadsheet Applications*

MENU PRICE ANALYSIS REPORTS

A Menu Price Analysis Report shows the impact of price changes on the food cost percentage. It may indicate the food cost percentage for the current menu item prices, the previous menu item prices, and the proposed menu item prices. It may also allow a manager to test speculative menu item prices and to make cost comparisons between various menus.

THEORETICAL USAGE REPORTS

A Theoretical Usage Report compares ideal usage, the amount which should have been used based on customer sales and recipe requirements, to actual usage. The exact loss of any food item can then be readily identified.

INDUSTRY INSIGHTS

TECHNOLOGY IN RESTAURANTS

Michael Fodor

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For a restaurateur, time and data are the most essential commodities. However, in the restaurant world mismanaged time and data frustrates ownership personally and professionally, as well as staff, and guests. Technology used properly offers a solution. Smart phones, tablets, electronic inventory and point of sales systems streamline staff administration and provide pertinent real-time information by efficiently using time and resources.

With the current available technology, a restaurateur's day is laid out before even entering the building. By simply checking a smart phone, a manager or owner can access previous day's numbers, notes, inventory, projected sales, and staff schedules. In this manner, one device saves hours of meticulous data analysis and allows the manager to spend time resolving more immediate issues.

In addition to mobile devices, intuitive inventory programs have the ability to automate several time consuming tasks in one place. An inventory program allows the manager to calculate theoretical costs and costs of sales in order to analyze the profit margin; the system is then able to create accurate grocery and liquor orders that can be electronically sent to vendors. This guarantees that proper amounts are ordered and waste is eliminated. Additionally, managers can use a handheld computer or tablet with a scanner to take an electronic inventory to compare theoretical with actual costs provided by the system. With the information, one can determine exactly which items help with the margin and simultaneously conduct menu analysis. By using this tool the manager will see a reduction in food and beverage costs and an increase in time to work with guests and staff.

Historically, gut feelings or hours of data examination have determined decisions to help prepare for a shift. With new real-time, up to the minute point of sale (POS) systems, managers have access to information from one or more restaurants available to them on a smart device in their pocket; information such as when employees' shifts begin and end, current sales and labor costs, and how the restaurant compares week to week or even year to

year. They can see which employees up sell well and have good table turns as well as taking reservations online, the current wait at the front desk and if the front of house quotes the wait time accurately. Once assessed, these times can be compared to cook times in the kitchen. The times are then adjusted by the system to accommodate for average cook times by item and even down to how long a rare steak cooks, compared to a well done steak; in this manner, all items for each table leave the kitchen at the same time, prepared properly. Such efficiency ensures that everyone works together to give the guest the best experience possible.

Because all inventory and staff are properly accounted for, the devices are able to provide fraud prevention alerts. A software program scans all transactions instantaneously and alerts that manager to potential theft by determining the variance between purchased and sold items. The program also has the ability to look for scams that employees use to defraud the restaurant such as the "Wagon Wheel," where an employee sells an item multiple times while purchasing the item from the house only once. As a result, the system constantly evaluates and ranks the staff based on the reports. In addition to theft prevention and discrepancy detection, the program in the POS system monitors all social media sites and reports on negative or positive reviews. Allowing the manager to identify and address customer dissatisfaction before the guest leaves the building generates a proactive approach to better dining reviews. Because of the efficient and expedient process, managers can quickly discern and resolve any problems either in lost capital or customer satisfaction.

New technology not only benefits management. Above and beyond posting reviews, guests also have the ability to interact firsthand with the restaurant by ordering food online, checking loyalty points and gift card balances, and even accessing their checks while in the restaurant. Once inside, customers have the ability to add items to the check, pay the bill on their smart phone, send themselves a receipt, and call their server to the table.

In an industry where time is money, technology is critical. Tighter controls, more accurate margins, and instantaneous data add breathing room to a restaurant manager's hectic day. Instead of spending time resolving tedious accounting issues, managers and owners have the opportunity to interact with their customers on a personal level. In a voraciously competitive industry that demands long hours and hard work, extra time on hand is a priceless asset.

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PERPETUAL INVENTORY REPORTS

A **Perpetual Inventory Report** identifies theoretical inventory levels based on the beginning inventory, purchases, and customer sales. This information is compared to actual inventory counts to compute inventory variances, which are caused by product waste (e.g., burnt steak), poor controls (employee steals two bottles of vodka), and failure to enter invoices into the menu management system (e.g., report indicates 5 cases of ribs but the actual count is 10 cases). Daily reconciliation of the perpetual inventory report for high cost items, such as meats, liquor, and seafood, greatly reduces inventory losses.

In the sample section of the theoretical usage report on the previous page, two types of muffins are evaluated: apple muffins and bran muffins. The actual usage of apple muffins exceeds the ideal usage, or what was entered into the POS, by seven muffins. That means that more muffins were consumed than the POS accounted for, resulting in a revenue loss and an unfavorable variance of \$3.78. Contributing factors could have been spoilage, spillage, pilferage, etc. For bran muffins, the opposite is true. This is likely due to a counting error or keystroke error in the POS.

PERPETUAL INVENTORY REPORT EXAMPLE						
Beg. Inventory	Inventory Received	Sold	Theoretical Inventory	Actual Inventory	Variance	
Napa Ridge Merlot 10 Bottles	9	6	13	15	2	
KEY TERMS						
POS System mobile payment system invisible payment system precheck terminal cashier terminal magnetic stripe reader fingerprint reader RFID reader programmable keyboard mobile POS devices pixelsense computing menu boards	m for restaut sys caller i invent ds invent food u reorde purcha	eware m system restaura rant reser dentifica ory contr ss free-po ory exten sage repo r quantit use order	a of accounts ints rvation ation system rol system our system asion report ort y report	bidding mod E-procurem receiving rep menu manag ingredient fi recipe file subrecipes menu item fi menu price a theoretical u perpetual in	lule ent port gement system le ile analysis report isage report ventory report	

WIRELESS APPLICATIONS IN RESTAURANTS AND REVPASH*

BY COURTNEY MANION-SMITH AND FRED DEMICCO, PHD

Courtney Manion-Smith is an Account Executive at NCR. (Mini-case developed together for IBM Food Service Presentation at FSTECConference)

Scene I: *Imagine* this: Mr. Smith and his family walk into a restaurant and instantly the hostess is notified who they are and what their seating preference is because of the radio frequency identification (RFID) device in their customer appreciation card. Another hostess is walking around the floor and notifies the hostess stand with instant communication from her hand-held that a window table has just been cleared and reset. The hostess at the stand can then take the Smiths to their preferred table.

After being seated at their favorite table Mike, their server, appears and his handheld wireless POS system is instantly updated with the guests' names, preferences, and possible drink and meal suggestions based on their previous ordering patterns. The table orders drinks based on Mike's suggestions and one minute later a runner from the bar places them on the table at the correct seats.

When the Smiths are ready to order, Mike notices right away because he isn't stuck in a line at the server station waiting to put their orders into a traditional POS system. Instead he's able to walk around, check on his customers, and provide them better service. Mr. Smith has a question about the veal entrée, and Mike is able to look up what exactly goes into it to provide Mr. Smith with the most accurate answer. He then goes beyond that and shows Mr. Smith an appetizing picture of the veal, which tempts Mr. Smith enough to order it. As Mike is taking the family's order, he is prompted with options like cooking temperature and available sides so that he doesn't forget menu options and then make a mistake later or have to come back to the table to ask. Mrs. Smith orders the pork chop, but unfortunately the last one has just been sold—Mike was instantly notified that it had been 86'd. She then chooses the Chipotle Chicken instead, and Mike sends the order to the kitchen right from the table, eliminating the usual 2- to 6-minute delay when using a traditional POS system.

It is important to point out here that Mike wasn't staring down at his hand-held the entire time the family was ordering, and he wasn't navigating through many screens as with a traditional POS interface. He was doing what any trained server would do—just writing down the order. The hand-held POS was then bringing up choices based on what he wrote

using handwriting recognition software so that Mike only had to press one item after he started to write the order. This allows him to make eye contact with his guests and provide the Smiths with better service.

Mike then goes to the next table and sees that they are ready for their check. He prints out their receipt from his portable wireless printer and leaves it on the table. This couple was in a hurry so they place their credit card down right away and Mike is able to swipe their card on his hand-held POS and print out the credit card slips right at the table.

Another table is ready for a second round of drinks; with one button Mike places the order, and in 2 minutes the bar runner appears with them. Since the restaurant has implemented this new hand-held POS system, Mike has been able to serve a larger section each night as well as more tables with the increased turnover. He's making so much money now that he has no desire to leave, which is one of the reasons server turnover is lower in such an efficiently run operation.

Unfortunately, going hand-held doesn't solve all problems, and the kitchen overcooked a guest's filet mignon. Mike handles the situation by apologizing and notifying the manager on his hand-held wireless POS system. The manager, Sarah, rushes right over to apologize as well and is able to comp the entrée and put a free round of drinks on their tab without having to go back to the server station. Sarah is still smoothing over the situation as the drinks appear; then the customer becomes very forgiving and goes back to enjoying his meal. Sarah then checks on the total sales, and finds the Revenue per available seathour (RevPASH) calculation for the evening, and sees that with the extra round of drinks that most tables order now that the system is so quick and efficient, combined with the increased table turnover on busy weekend nights, that the hand-held wireless POS system has just paid for itself. She is also thrilled because she can use the same hand-held device during the day but load it up as an inventory device and complete her inventory and ordering in one-third the amount of time, thanks to the same radio frequency identification technology that lets the hostesses and servers know who is in the restaurant.

Sarah also knows that more people have been coming to the restaurant since it has outsourced to a data mining company to develop their customer database and help manage inventory better. When customers sign up for a customer appreciation card, all of their preferences are stored in the customer database. If they typically come in for burgers, they are notified about promotions like 50% off burger Wednesdays or sent cards where if they

buy six burgers the seventh is free. Customers who have never ordered a burger are left out of this mailing so as not to be bothered unless they are truly interested. These marketing attempts have helped bring in more business.

The restaurant is also saving money in ordering by controlling its inventory with the hand-held system and installing automatic ordering when possible, so when a manager takes inventory, the system knows how much the restaurant wants on hand and then electronically orders what is needed. The menu is also more effective because data mining is used to determine what items bring in the most revenue, what items have the highest margin, and what less popular items are most popular with customers who bring in a large amount of business.

In addition, reservations systems can tie into frequency or loyalty programs to give staff information such as table preferences, wine preferences, and special occasions such as birthdays. It has been estimated that the cost of taking reservation by phone is \$4.00 (when labor and phone costs are factored in), but only \$1.00 if over the Internet. There are many choices for online restaurant reservation systems that give frequent diner points every time a reservation is made online. The system can include features such as asking to be notified if an earlier table time opens up.

Questions

- 1. How could RevPASH be applied in a restaurant you work at now, or have worked at, taken a class in, or dined at? Give specific examples. Would it have a positive impact or not?
- 2. How does the wireless ordering technology described in this mini-case impact the guest experience from an efficiency perspective (e.g., time saved), and effectiveness (smooth process, improved guest services, getting it done right (the first time), etc.?

Provide some specific examples for a restaurant.

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REVIEW QUESTIONS

- 5-1 What are Point-of-Sale systems?
- 5-2 List some benefits of using technology in a restaurant.
- 5-3 Describe the differences in POS terminal designs.
- 5-4 How do handheld POS and traditional POS differ?
- 5-5 What are the functions of kitchen display systems?
- **5-6** Explain the functions of a menu management system.

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