A Framework for Restaurant Information Technology

by Daryl Ansel and Chris Dyer

Advances in information technology (IT) have radically altered the way many industries conduct their business. Retailing and banking are examples of businesses that have made substantial use of IT to reengineer their operations. Consider how bank ATM machines have dramatically changed the nature of the financial services industry. Note also how retailers are redefining their supply chain by setting up sophisticated information net-

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works that instantaneously record what customers are buying—allowing retailers to establish "just-in-time" inventory for each store. For all the innovations possible with IT, however, the commercial restaurant business has seemingly been slow to adopt the most current information technology. Technology has typically been viewed as an additional cost of doing business, rather than an investment in future profitability. Increased costs are avoided in an industry characterized by small profit margins. Only in the past ten years has the industry consolidated enough to produce companies with appropriate planning horizons and resources available for substantial investment in technology.

To encourage adoption of value-adding information technology in the restaurant business, we outline in this article a framework for an integrated approach to systems planning. We also provide a decision model that is intended to assist chain-restaurant operators in evaluating investments in information-technology systems. We consider this article to be only a preliminary step, but a necessary one, toward reducing the confusion regarding information technology in the restaurant industry.

While much of the material underlying this article is from existing sources (i.e., academic journals and practitioners' resources), we contacted several chain-restaurant companies in hopes of creating a mini case study. Unfortunately, we could find no company that could demonstrate successful development of comprehensive and integrated applications of information technology. In lieu of those interviews, we discussed our framework with Cornell Professor Sheryl Kimes, who shared the results of her research on restaurant revenue management, and with two current Cornell Ph.D. candidates, Liz Ngonzi and Deborah Barrish, both of whom have direct industry experience.[1]

Historical Approaches to IT Development

Although we have asserted that restaurants' IT adoption has been slow, that does not mean restaurants are bereft of technology. Instead, restaurants initially focused on cutting costs (as did other hospitality firms) by automating their back-office functions, including payroll, accounting, and inventory systems. Part of the difficulty that restaurant firms face today regarding updating their IT systems stems from this period, because each company typically installed its own proprietary software, with little concern for prospective integration of those systems and no thought to how well the systems would perform as the company expanded (an issue called "scalability").

The now-familiar POS systems appeared in the early 1980s, transplanted from retail merchandising. These useful machines fit well into restaurant operations. To begin with, they freed employees from having to remember items' prices, since operators could simply designate a key for each menu item. They also allowed managers to update prices, change menu items, and track sales data with the touch of a button. In addition, receipts could be reconciled more accurately than in a manual environment. Once again, however, early systems were proprietary, and vendors required restaurants to purchase hardware and software bundles, as well as custom installation.

Upgrading POSs. Most investment in IT development in the 1990s has focused on augmenting POS systems, in particular by integrating the POS with accounting and payroll systems. Restaurant chains have in many cases developed central databases to store information coming from the POS and have linked that information to their accounting systems. Unit-level polling is now a common practice for data analysis and reporting.[2] At the same time, restaurant companies can purchase increasingly sophisticated back-office software packages from a growing number of vendors. Systems in the 1990s are no longer necessarily custom-designed for each restaurant company, although each vendor has its proprietary technology, but scalability and integration remain concerns, even as vendors' provide more off-the-shelf products. In particular, companies that designed their own back-office software when they were small or operating over a limited geographic area had to reconsider those systems as they expanded. The typical solution to such issues usually involves standard PC-based software, wide-area networks, and client-server architecture.

We believe, however, that most of the restaurant industry still views IT chiefly as a back-office support function. The framework we present below is intended to allow management to plan IT functions for the entire restaurant operation.

At the Cutting Edge

To better understand the direction of restaurants' IT development, we reviewed restaurant-focused IT products and examined forward-looking projects being undertaken by leading restaurant companies. We found that the number of vendors focused on restaurant IT development is expanding so rapidly that what was a gradual evolution is becoming a speedy revolution.

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[1] Liz Ngonzi worked for Micros, one of the leading POS developers, and Deborah Barrish worked for Brinker International, one of the most successful U.S. restaurant chains.

[2] "Outsourcing IT Functions," *Nation's Restaurant News*, special FS Tec insert, May 19, 1997, p. 11.

Below we briefly summarize key product categories and a few "cutting edge" projects. Our list is by no means exhaustive.

Point-of-sale systems. As we said, POS systems continue to be at the heart of restaurants' information technology. Leading vendors (e.g., Micros, Squirrel, Ibertech) strive to outpace each other by making their packages ever more comprehensive. Key advances include:

- Capability of tracking menu availability automatically in real time as items are sold. This eliminates the awkward situation that occurs when the kitchen has run out of an item, but the servers don't know it yet—until, that is, a customer orders the item.
- Enhanced graphical user interface (GUI) to simplify training and ease of use.
- The ability to track meal duration (in table-service restaurants) or service timing (in quick-service operations).
- Kitchen display systems to better track order status.
- Improved reporting capability, including graphic printout, to support managers' analysis and decision making.
- Advancements in input devices, including touch-screen and remote hand-held devices.
- More open-architecture and PC-based systems, allowing restaurant operators to make decisions independent of a single vendor regarding what equipment to purchase.

Table-management systems. A number of vendors are developing table-management systems as a plug-in component to POS systems. (Rock-Systems ProHost, for example, offers an effective table-management system.[3]) Table-management systems are designed to track table status to improve timeliness of service and speed turns. These products offer the following features:

- Reservation and floor-plan management;
- Management of wait list, table availability, and customer paging;
- Tracking of seated parties by meal part;
- Server-station management; and
- Management reports and statistical analysis.

Order-entry systems. For quick-service applications, some companies are developing direct customer-order-entry systems. Radiant Systems, for example, is marketing a system called OrderPoint, intended to reduce customer wait time and reduce front-line staffing. A kiosk setup allows customers to place orders on touchscreen terminals. Graphics and icons illustrate available menu selections. Order-entry systems can also be integrated with frequent-dining programs and other electronic-commerce applications.

Production-support systems. Some IT products will support restaurants' production functions. One notable product in this category is offered by EATEC.[4] This system provides sales forecasting, production planning, workforce scheduling, menu engineering (with integrated recipe database and nutritional analysis), cost accounting and pricing formulation, and inventory control and purchasing management.

The system is designed to allow easy electronic integration with other systems such as those supporting POS, reservations, and financial management.

Enterprise-resource systems. So-called ERS applications are transferable to restaurants, having been developed for other industries. For example, PeopleSoft, originally focused on the retail sector, has recognized the opportunities of targeting the chain-restaurant industry. PeopleSoft provides restaurant companies such as CKE, Wendy's, and Brinker International with software for financial, human-resources, and supply-chain management.[5] Existing restaurant IT vendors are facing increasing competition from companies like PeopleSoft and Oracle, whose applications encompass a broader approach to system coordination and integration.

Innovative Projects

Restaurant trade journals regularly feature companies undertaking innovative IT projects. For the third straight year, the industry held a conference, FS Tec, specifically devoted to IT development and products. Our review of trade literature and company interviews revealed projects ranging from systems to monitor refrigeration temperatures to development of company intranets for training and communication. Below we describe a few of the projects that we found particularly intriguing.

CKE. This fast-growing QSR conglomerate is developing ways to transfer, store, and analyze data across disparate IT platforms in its Carl's Jr. and Hardee's chains. The company's goal is to create a cohesive system that can be scaled to accommodate future acquisition plans. CKE has a two-part strategy:[6]

(1) Acquire a suite of financial, human-resources, and supply-chain software products that will be functional enterprise-wide and make the back-office systems consistent across the firm; and

[3] See: «www.rock-systems.com» or «www.micros.com».

[4] See: «www.eatec.com».

[5] Ed Rubinstein, "Virtual Private Networks: Intranets on the Cheap?," *Nation's Restaurant News*, April 20, 1998, p. 73.

[6] Ed Rubinstein, "CKE Taps New Technology for 21st Century Growth," *Nation's Restaurant News*, August 3, 1998, p. 81.

(2) Adopt Informix's relational online analytical-processing platform, which is called MetaCube. Through web access, managers in all units will be able to examine data for query and analysis. The vast organizational data warehouse will allow users to answer sophisticated operational and marketing questions.[7]

Wendy's International. Wendy's is concentrating its IT investments on improving processes that affect customer service. Now at $2 billion in sales, Wendy's is developing a database to track the length of each service transaction and customer wait time, with a goal of identifying how to speed service.[8] Wendy's has also installed a "scoreboard" at each drive-through that electronically displays a customer's order. The scoreboard is attached to the POS and is intended to improve the accuracy of order fulfillment and to reduce labor needed for data entry.

Levy Restaurants. Levy has contracted with Data Central U.S. for a central web-based database service to manage frequent-dining programs.[9] Using phone lines, the company captures customer information via the restaurants' VeriFone terminals or from the POS. Operators are able to query the database to analyze customer-dining trends.

Mazzio's Corporation. This 225-unit U.S.-based pizza chain is using the internet to extend its call-center-based delivery services. Customers anywhere in the country can call a local number, which is routed to one of the chain's two national call centers.[10] Orders are automatically transmitted within seconds over a virtual private network through the internet-service provider (ISP) to the appropriate restaurant unit.

Papa John's Pizza. Now the fourth largest and by its own admission the fastest-growing pizza company in the United States, Papa John's offers customers nationwide on-line ordering through an alliance with Food.com (formerly Cybermeals), the leading internet online restaurant-order service. Customers can order from the Papa John's web site anywhere in the country for local delivery within 30 minutes. We found many companies exploring the opportunities of electronic commerce.

The Cheesecake Factory. This chain is working with IT consultant Bill Lyons to develop a sophisticated data warehouse. This warehouse will perform trend analyses that will help unit-level managers make more-informed decisions about their menu mix.[11] In addition, the data warehouse will help unit managers know which ingredients sell best and how much to order, so they can negotiate favorable purchasing contracts with suppliers.

Cracker Barrel. This chain, which generates half its sales from retail merchandise, is developing a retail-type enterprise-resource-planning system to improve inventory management, purchasing and receiving, product allocation, and replenishment for its retail outlets.[12]

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[7] For a discussion of data warehouses, see: Robert K. Griffin, "Data Warehousing: The Latest Strategic Weapon for the Lodging Industry?," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 39, No. 4 (August 1998), pp. 28–35.

[8] Tom Davey, "Personalized Service at Lower Cost," *Information Week*, September 14, 1998, pp. 173–177.

[9] Ed Rubinstein, "Levy Restaurants Gives Operations Preferential Treatment by Outsourcing Frequent-dining Program," *Nation's Restaurant News*, October 19, 1998, p. 44.

[10] Ed Rubinstein, "Mazzio's Uses Web to Extend Pizza Delivery," *Nation's Restaurant News*, October 19, 1998, p. 46.

[11] Ed Rubinstein, "Natascha Kogler: Assuring Smooth, Factorylike Automation at The Cheesecake Factory," *Nation's Restaurant News*, October 19, 1998, p. 48.

[12] Ed Rubinstein, "No Cork in this CIO's Barrell: Mike Methany Keeps Cracker Barrel's Systems Flowing," *Nation's Restaurant News*, November 2, 1998, p. 52.

Satellite transmissions are used to poll data for use in Electronic Data Interchange (EDI) supply-chain links. Cracker Barrel is also using the satellite system and the internet to facilitate video conferencing, update training programs, and download new menus.

Burger King. At this year's FS Tec conference Burger King won an Innovation Award from *Nation's Restaurant News* for its new POS system rollout.[13] Burger King has implemented a new POS system that uses Windows NT technology for ease of use, incorporates workforce scheduling based on demand forecasts, and is fully integrated with back-office functions.

Chick-fil-A. This chain won the 1998 FS Tec team-excellence award for implementing an internet-based payroll system across its entire chain.

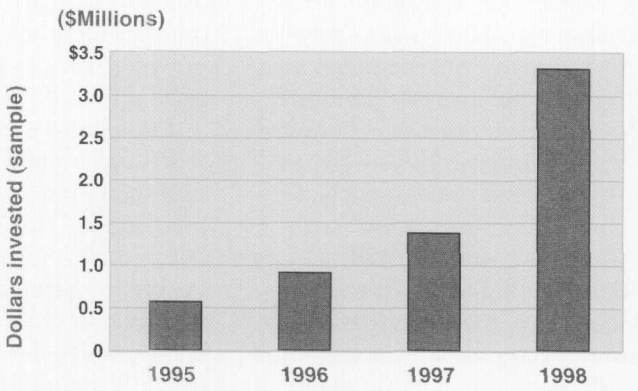
A Strategy for IT Planning and Development

While the restaurant industry seemed slow to adopt technology in the past, its recent advances have been remarkable for their speed, particularly in view of the capital involved. As shown in Exhibit 1, Ernst and Young found triple-digit increases in restaurant companies' technology investment in 1998.[14] Despite the huge investment, however, our examination of restaurants' IT projects leads us to believe that few restaurant companies have identified a clear IT-investment strategy.

A focused strategy is essential, because the same factors that limited restaurant companies' technology investments in the past are still extant, in particular the slim margins. Thus, we do not see how restaurants can afford continual, large investments in complex systems as some industries (e.g., financial services) have done. Instead, we suggest that restaurateurs choose technology carefully and not merely jump on an "electronic bandwagon" by purchasing technology indiscriminately. Berry made this point, as well, saying that operators must "determine how to manage technology and build an infrastructure that supports growth, fosters a tangible return on investment, and results in technology upgrades that do not require major overhauls every couple of years."[15]

Exhibit 1

Restaurant-industry investment in IT



Source: Ernst & Young, 17th Annual Survey of Retail Information Technology, as reported in "Restaurants: Product Innovation Is the Calling Card," *Chain Store Age*, section 2, Vol. 74, No. 10 (October 1998), pp. 36-37.

We derived four possible strategies from our examination of current developments that may help focus and drive restaurant IT development, as follows.

Strategic competitive advantage. Some restaurant companies believe information can be used to establish a strategic advantage. Darden Restaurants, for instance, uses IT systems to optimize menu offerings across its 1,150-restaurant chain. Each order is recorded in the company's data warehouse to allow corporate executives to analyze customer preferences and tailor the menu precisely to its target market.

Supporting human resources. IT development can support human resources, allowing employees and managers to pay more attention to customers. At the 1998 MUFSO conference, seminar participants concluded that technology should be considered an "enabler," to make processes easier for employees.[16] Technology also allows companies to improve the effectiveness of training. For example, Atlanta-based AFC Enterprises, a major Popeyes franchisee, keeps training materials up-to-date and readily available by using an intranet among its 450-plus units that offers video conferencing and audio capability.

Minimizing costs. The quest for reducing costs is unending. As part of its Efficient Food Response initiative, food distributor Sysco has developed customized SAP enterprise software to track its customers' inventories to allow for automatic restocking. This application is integral to Sysco's goal of being the single purveyor of all supplies and equipment to large food-service companies.[17]

Revenue management. Information technology continues to be

[13] Ron Ruggless, "BK, VICORP, Compass, Win FS Tec Innovator Honors," *Nation's Restaurant News*, December 7, 1998, p. 58.

[14] "Restaurants: Product Innovation Is the Calling Card," *Chain Store Age*, October 1998, pp. 36–37.

[15] Cydney Berry, "Tips to Help Operators Take a Nutritious 'Byte' Out of Technology," *Nation's Restaurant News*, June 1, 1998, p. 38.

[16] Mark Hamstra, "Operators Grapple with Technology at Work," *Nation's Restaurant News*, October 5, 1998, p. 78.

[17] Davey, pp. 173–177.

Exhibit 2

IT support of revenue-management tools

RM method	Approach	IT system support
Define meal duration	Time and event	Track meal duration by meal part
Reduce uncertainty of arrivals	Forecasting	Forecasting systems
	Overbooking	Guest-history systems
	Reduce no-shows	Reservation systems
	Manage reservations	Table-configuration optimization
Reduce meal-duration uncertainty	Redesign and control process	Track food-preparation and -consumption times
	Redesign menus	Table-management systems
	Improve labor scheduling	Forecasting and workforce scheduling
	Improve communication	
	Improve bussing	
	Speed check delivery	
Reduce time between customers	Redesign and control process	Table-management systems
	Improve communication	Buzzer systems
Differential pricing	Frequent customers programs	Guest-history and frequent-customer systems
Shift demand	Non-physical rate fences (e.g., time-of-day or -week variances, advanced reservations, duration charges)	Menu-management systems
		Table-management systems
		Improved POS system
	Physical rate fences (e.g., alternative menus, differential floor sections or rooms)	

Note: We are indebted to Sheryl Kimes, professor at the Cornell University School of Hotel Administration, for her assistance in developing this framework.

the enabling force behind sophisticated revenue management techniques in many industries (e.g., airlines, hotels). Revenue-management principles applied to the restaurant industry may prove to be one of the best strategies for driving IT development in restaurants.[18] RM requires a comprehensive framework to deliver the data that can be used to focus on maximizing revenue and to better control demand (i.e., duration management and pricing).

RM also provides a measure of return on investment. Exhibit 2 is an example of the framework connections among revenue-management principles to be considered during information-technology development.

Framework of a Core System

The schematic in Exhibit 3 shows the framework we propose for IT development in the restaurant industry. The integrated system we envision supports a revenue-management approach.[19] We identify only the core components and exclude peripheral systems that could enhance this core. Our framework is divided into three parts: production systems, enterprise-resource-planning systems, and external systems. Each box in the graphic represents a different application of information technology, as explained below.

Production Systems

Forecasting. Demand forecasting enhances the restaurant's ability to maximize revenue based on its capability to accommodate demand. Forecasting demand is the first step toward planning for critical scheduling factors that affect restaurant capacity: table availability, labor needed, and raw goods to order. The ideal forecasting system would provide an accurate estimate of arrivals by 15-minute periods and of expected meal duration. The system would also estimate the numbers of each menu item to be sold.

Scheduling. Demand forecasts drive scheduling in three areas: reservations, the service floor, and the kitchen. A scheduling system for reservations management would identify the optimum table configuration for each meal period and the best times for which to accept reservations. Ideally, the system would also qualify reservations based on a guest's patronage. Such a system would support sophisticated reservation policies to ensure, for instance, that only customers with a history of spending a certain average amount per hour are booked during peak times (if the restaurant wanted to set such policy).

The scheduling system for the front of the house would identify which employees are needed and what shift pattern will be most effective, as well as match employee availability and capability with the restaurant's needs.[20] Matching service

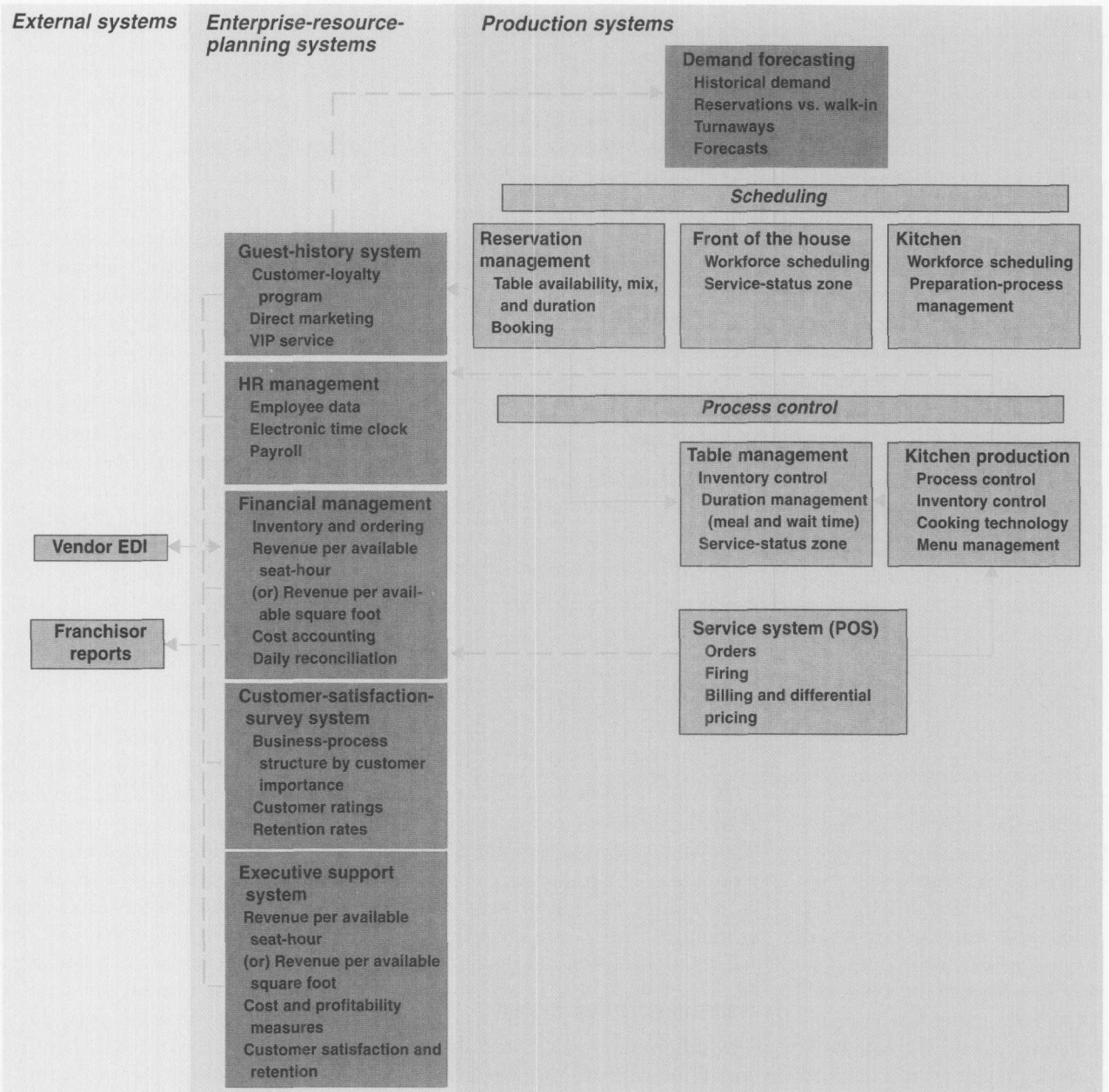
[18] A more complete discussion of restaurant revenue management concepts can be found in: "Restaurant Revenue Management: Applying Yield Management to the Restaurant Industry," by Sheryl Kimes, Richard B. Chase, Sunmee Choi, Philip Lee, and Elizabeth Ngonzi, *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 39, No. 3 (June 1998), pp. 32–39.

[19] The core concept of restaurant revenue management is further discussed in: "Implementing Restaurant Revenue Management: A Five-step Approach," by Sheryl Kimes, on pages 16–21 of this issue of *Cornell Quarterly*.

[20] This function is the topic of "Labor Scheduling, Part 4: Controlling Workforce Schedules in Real Time," by Gary Thompson, on pages 85–96 of this issue of *Cornell Quarterly*.

Exhibit 3

Function framework for integrated restaurant IT system



needs with employees' skills can have a dramatic impact on meal duration. For example, high-demand periods typically require the most experienced and capable servers, who can maintain a fast service pace while continuing to satisfy their customers.

The principles of kitchen scheduling are similar to those of the front of house. However, kitchen schedules must also take into account food-preparation plans based on menu-item-sales forecasts. The system should establish scheduling for prep work as appropriate. With this information the system should also provide a grocery list of goods needed and electronically order those goods through vendors' EDI links.

Process control. While effective scheduling is essential, a good schedule will not automatically

ensure a successful restaurant in the absence of appropriate management at the time of service. Process-control applications will assist with table management, kitchen production, and the actual presentation to the customer.

We have already alluded to the importance of managing meal duration as a contribution to maximizing revenue. Table-management systems are a key method for facilitating management's role in monitoring and controlling the available inventory of tables and in improving communication within the service team. Servers need systems that provide visual signals of each table's status at each critical part of the meal. The system should also collect and store information about the duration of each party's meal part to allow managers to consider bottlenecks that might result from types of food orders, party size, and time of day.

Managing the kitchen is, needless to say, essential to smooth functioning on the service floor. Kitchen production systems should precisely calculate kitchen processing time by menu item and track the kitchen's actual performance against expected norms. A key moment in the service process is when the table servers fire the order to the kitchen. If that step were electronically linked to table-management systems, both meal duration and service quality could be controlled and improved. Managers can also improve the process and remove production bottlenecks through analysis of archived information by time of day, menu-item sales mix, and party size.

Traditional POS-system capabilities should be expanded to accommodate a revenue-management approach, in particular by permitting differential pricing, so that wholesale reprogramming is not required when a few changes are made. The system should be able to respond to current demand conditions and related pricing strategies and be able to alter prices and menus accordingly. Further, the POS system should be linked to the table-management system and the guest-history system to track average meal duration and dollars spent per hour.

Enterprise-resource-planning Systems

Supporting the production systems are applications that generate management reports on critical performance indicators and provide base data for improved marketing in restaurant companies. Those systems track guest history, help manage human resources and finances, assess customer satisfaction, and provide executive-level support.

Guest history. By tracking customers' demographic characteristics, dining patterns, average meal duration, and typical amounts spent per hour, restaurants can do a better job of booking the right customers at the right time, serving customers, practicing differential pricing strategies, and implementing displacement plans associated with overbooking. The ideal system would be structured as a data warehouse and would include customer-contact data and transaction data. The system would allow analysis of those data in aggregate, by segments, and by time of day, and would support direct-mail marketing functions and frequent-dining programs. The system would also allow floor managers to keep detailed notes on customer preferences.

Human-resources management. Deploying labor effectively is one of the most important tasks in service organizations.[21] HR systems can be used not only to automate standard transactions (e.g., compensation and benefits), but also to keep profiles of employees' experience, training capabilities, and availability to allow more sophisticated workforce scheduling. HR systems should also link workforce scheduling to electronic time clocks to ensure that employees can punch in only during scheduled work hours.

Financial management. At minimum, the firm's financial-management system would provide daily polling of revenue and cost data across all units of the restaurant company. Ideally the system would provide a dynamic real-time revenue-management measure, such as revenue per available seat hour (RevPASH), by unit, by region, and for the entire chain. Such a system would help restaurants go beyond evaluating their operations by average sales (check average) and total covers. The financial-management system should also incorporate electronic inventory monitoring and consolidated purchasing through EDI links with external vendors.

Customer satisfaction. Few restaurants have an appropriate methodology for monitoring customer satisfaction, but considerable research confirms the link between high levels of satisfaction and financial return.[22] IT systems now make it possible to monitor customer satisfaction frequently and to analyze trends and relate customer satisfaction to staff performance, revenue trends, and retention rates.

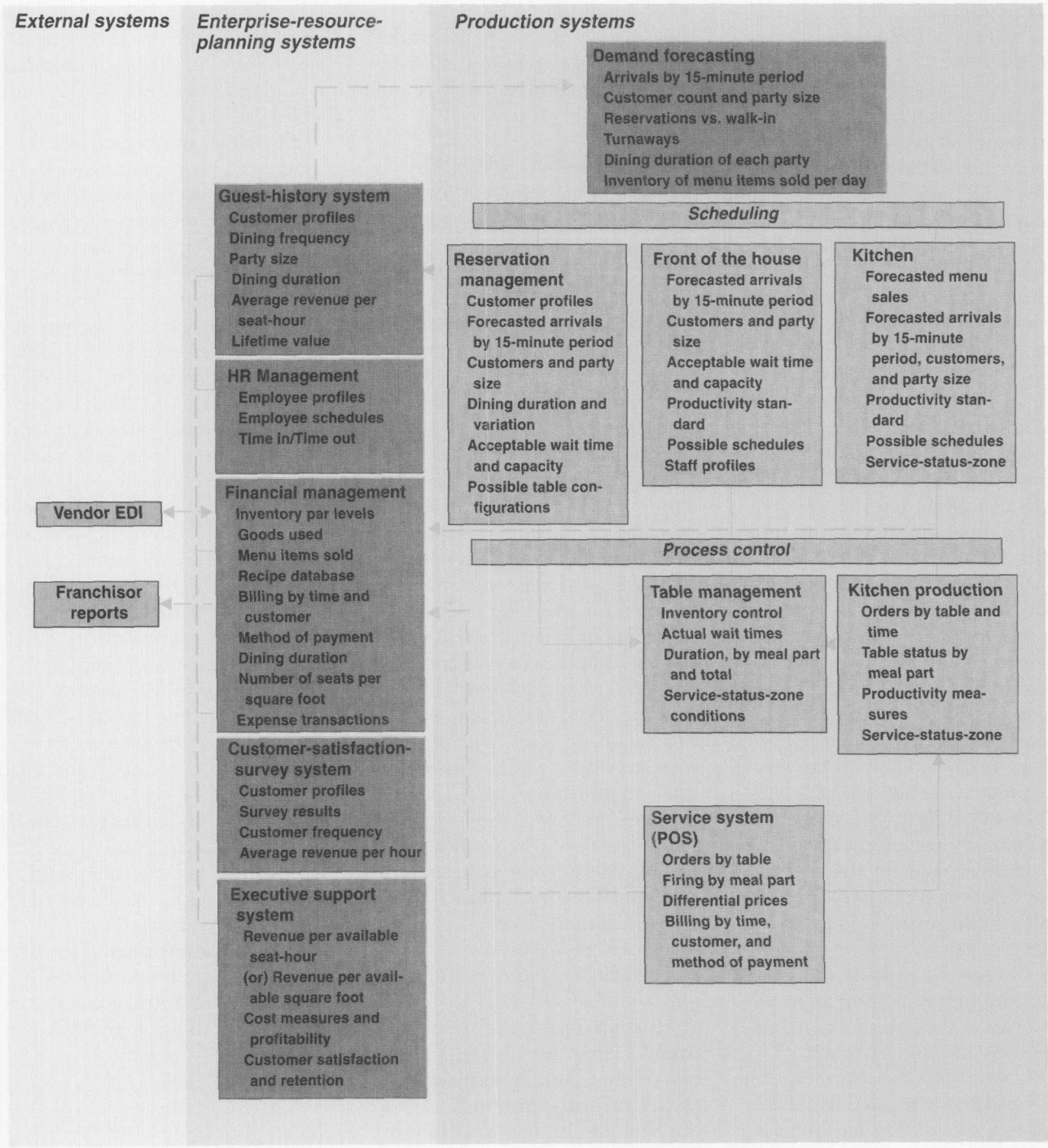
Executive-support systems. These systems provide key daily measures of performance across an entire chain to top executives. Key

[21] Gary M. Thompson, "Labor Scheduling, Part 1: Forecasting Demand," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 39, No. 5 (October 1998), pp. 22–31.

[22] For example, see: Christopher W.L. Hart and Michael D. Johnson, "Growing the Trust Relationship," *Marketing Management*, Vol. 8, No. 1 (Spring 1999), pp. 8–19; and Fornell Claes, Christopher Ittner, and David Larcker, "Understanding and Using the ACSI: Assessing the Financial Impact of Quality Initiatives," Proceedings of the Juran Institute's Conference on Managing for Total Quality (Wilton, CT: Juran Institute, 1995).

Exhibit 4

System-data framework for integrated restaurant IT system



measures might include revenue per available seat by unit, traditional profitability and cost ratios, customer-satisfaction ratings, and comparisons with industry benchmarks, as well as other value-based measures.[23] The ESS should also provide alerts when a unit is not meeting performance targets, and allow executives to draw information from the data warehouse to analyze the situation.

External Affairs

Finally, restaurants' IT systems will need to communicate with external systems, particularly those of the franchise company and of third-party vendors.

Franchisor reports, payments. Electronic connections between franchisors and franchisees offer many opportunities to improve services to local restaurants and communication among all units. The ideal system would provide franchisees with business-support-system updates, including accounting, food costing, inventory management, and labor scheduling. The accounting system would automatically calculate payments due the franchisor and allow electronic fund transfers.

Vendor EDI. Retail merchandisers have used the fast-developing technology of EDI to achieve reductions in inventory and waste and also to automate financial transactions. By linking forecasting of menu-item sales with recipe databases and inventory systems, restaurateurs could replenish their inventories as needed via direct electronic connections with vendors.

Today's Systems and Efforts Fall Short

While restaurants are, in fact, developing IT applications for each area found in our framework, we see those products and initiatives underway as being disjointed. No company seems to have a comprehensive perspective that takes into account the interrelationships among various system components. Along that line, Grimes offered this assessment in 1998: "The need for integration is just beginning to be felt."[24] Even as restaurant management becomes more data driven, systems are being developed on a wide array of platforms that cannot easily share information. For example, moving information from a restaurant's POS system to its accounting system often requires complex software patches. Grimes added: "Going forward, a big opportunity is likely to develop for all front- and back-of-the-house systems to share a single computer network that centralizes and transmits data from all applications into one pipe."[25]

The point of our proposed framework in Exhibit 3 is that full integration of system components is critical to achieve the most far-reaching objectives of information technology development, to operate efficiently and maximize revenues, and to measure the return from the investment in IT development. Taking our framework one step further, we have identified data requirements for each functional component and found overlaps among many data elements, as shown in Exhibit 4. From this overlap, we conclude that the easy transfer of data and communication between components is critical.

An IT Decision Model

With all the new products and technologies available, one may be tempted to think that more IT is automatically better IT.[26] Such an

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[23] James Heskett, Thomas Jones, Gary Loveman, W. Earl Sasser, Jr., and Leonard Schlesinger, "Putting the Service–Profit Chain to Work," *Harvard Business Review*, March–April 1994, p. 164.

[24] Rob Grimes, "Keep Systems in Sync through Integration," *Nation's Restaurant News*, October 19, 1998, p. 44

[25] *Ibid.*

[26] Berry, pp. 173–177

Exhibit 5

Calculating RevPASH

Annual revenue		$3,000,000
Days operating	312	
Hours per day	10	
Number of seats	200	
RevPASH		$4.81

Divide annual revenue by the next three items to derive RevPASH.

Exhibit 6

Two examples of RevPASH-based investment decisions

Example 1: Table-management system

Prospective operational improvement: 0.1 turns per two hours (from 1.2 turns to 1.3 turns per two hours)
Number of peak hours: 3; Number of seats: 200
Additional customers: 30 (200 seats x 3 peak hours x 0.1 turns per two hours or 0.15 total turns)

Effect on RevPASH

Check average: $10
Additional annual revenue: $93,600 (30 customers x $10 average check x 312 operating days)
RevPASH increase: $0.15 ($93,600 ÷ 3,120 operating hours ÷ 200 seats)

Return on investment (five-year horizon)

Estimated development cost	$45,000
Implementation and training	8,000
Annual upkeep	25,000
Total investment	78,000
NPV @ 10% discount rate*	$267,149
Internal rate of return	166%

Example 2: Guest-history system

Additional customers per day	3
Additional annual revenue	$9,300
RevPASH increase	$0.01

Return on investment (five-year horizon)

Total investment	$35,000
NPV @ 10% discount rate*	$231
Internal rate of return	10%

*For a discussion of how to calculate net present value (NPV), see: *Corporate Finance*, fourth edition, by Stephen A. Ross, Randolph W. Westerfield, and Jeffrey Jaffe, published by Irwin in 1996.

approach is likely to lead to unnecessary and costly spending, but the opposite view, which is held by restaurants that continue to make IT a low priority, is also unwise. The best approach is a careful balance of purchasing sufficient technology to support the company's strategic plan without going overboard. Each IT project must be measured against a carefully established ROI test.

Unfortunately, we could find no models available to quantify such decision making. Our review of the literature uncovered only the following guidelines:

- Technology projects should maximize competitive advantage to provide the shortest payback period. Technology projects should be part of the driving force behind accomplishing the key strategy of the company.
- Because the pace of change in technology results in a new product cycle of six to twelve months, restaurant companies need to build an IT infrastructure that is scalable, flexible, and broadly integrated. A restaurant should have a comprehensive systems plan, even if actual development is relatively piecemeal. In addition, computer purchases must take into account likely obsolescence of existing systems.
- Development timetables must be circumscribed, making outsourcing more cost-effective in many cases than developing one's own system. Contractors should be viewed as partners in systems development, rather than simply as vendors selling a product.[2]

Although we could find no published research that discussed ways to quantify decisions on implementing IT, we believe that a calculation based on revenue-management figures can be made to provide a quantifiable measure of return. Investment in each system component can be evaluated and prioritized by its expected impact on revenue per available seat-hour. As illustrated in Exhibit 5, a RevPASH calculation allows one to compare the prospective effects of different systems using a common measure, even though the systems have diverse effects on operations.

Structured Expansion

We believe that restaurants' revenue-management strategies may help guide the industry's IT development. With this in mind, we have provided a framework for an integrated approach to IT development for chain-restaurant companies, as well as a decision model restaurant operators can use to evaluate investments in IT systems.

Finally, we would like to note that this research is preliminary and would benefit from further study. We suggest controlled testing to determine whether this framework is, in fact, practical for planning and evaluating IT development, as well as further assessing how best to sequence development efforts.

[2] Terrence K. Babbitt, "A New Era for Outsourcing Solutions: Is the Food-service Industry Ready?," *Nation's Restaurant News*, March 2, 1998, p. 62