

THE APPLICATION OF COMPUTERS
IN THE RESTAURANT INDUSTRY

by

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RESEARCH PROJECT SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF BUSINESS ADMINISTRATION
in the Department
of
Economics and Commerce

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SIMON FRASER UNIVERSITY
March 1979

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The Application of Computers in
the Restaurant Industry

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ABSTRACT

This study examines the present and potential uses of computers in the restaurant industry. The high failure rate of businesses within the industry is largely due to the lack of adequate operational and financial controls. The application of computer technology is one of the most appropriate means of providing such controls.

Research was carried out in all sectors of the hospitality industry in an attempt to define present and potential applications from the restaurant operators' point of view. The author has also drawn upon his personal experience as an employee of a restaurant chain which is considering computer installations at the restaurant level. Interviews were conducted with most of the major equipment vendors and an exhaustive search of the computer and hospitality trade publications was completed. The author conducted further research at the hotel school which is most involved in research on computer applications in the hospitality industry.

The study confirmed that the restaurant industry has remained relatively untouched by the point-of-sale revolution which began in the general retail industry some eight years ago. However, the professional management attitude being introduced to the restaurant industry by the chain operations is beginning to rectify this situation.

Advances in computer technology are becoming significant at all levels of business operation. The introduction of microprocessors in particular has provided the break-through in making computer usage a practical reality for even the single-restaurant operator.

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CHAPTER ONE

INTRODUCTION

Scope of the Report

The retail sector of the food service industry is generally classified into two segments, based on the level of service provided. Restaurants provide table service (in which food is brought to the customer), and fast food operations provide pre-prepared food which may or may not be brought to the customer. Although reference is made to fast food operations, for the purposes of comparison, the applications described in this study are specific to table service restaurants.

As the report presents the state-of-the-art in restaurant management controls, it is more likely to reflect the experience in the larger restaurants and the publicly owned restaurant chains.

Problems Faced by the Restaurant Industry

With the increasing emphasis being placed on decor and atmosphere to attract customers, the initial capital requirements for a new restaurant venture further increase the potential losses which could be incurred.

Table I illustrates the failure rate for Canadian restaurants, and the industry's relatively high ranking within the classifications reported by Dun and Bradstreet.

TABLE I

The Restaurant Failure Record in Canada

From 1972 to 1977

	1972	1973	1974	1975	1976	1977
Number of Failures	188	158	131	198	190	263
Rank within 41 Industry Classifications	6	7	9	5	5	5
Rank within 10 Retail Trade Classifications	3	3	5	2	2	4
Average Liabilities (in \$000)	33	38	48	71	73	162

Source: Dun & Bradstreet, "The Canadian Business Failure Record 1977", Toronto, Ontario.

The most common internal factors contributing to the speculative nature of the business relate to both operations and personnel. The industry has been unable to take advantage of the productivity gains experienced in most other sectors of the economy because it is essentially a labour-intensive industry.

In spite of the inroads being made by the chain operations, the restaurant industry is still characterized by a high proportion of small, individually-owned enterprises. The small enterprise with its dedicated, owner-manager, can provide a much more personal service to a comfort-conscious patron. The small size of most enterprises, however, contributes to a major problem in the industry, namely, the slow development of the necessary skills in marketing and managerial control.

In the smaller enterprise, managerial control is exercised at a minimal level due to the competing demands on the owner-manager's time and his inability to resolve operational problems, implement sound accounting practices and plan for the future. As an example, the "cash residual method" of accounting and cash control is still prevalent in the industry. The many operators still using this method calculate their daily gross profit based on the cash remaining in the register--which is assumed to be the difference between their daily revenue and expenses. The personnel problem is characterized by a rapid turn-over of staff, relatively low wages and a lack of basic skills, motivation and other important job qualities in the typical employee.

In spite of these problems, the restaurant industry continues to attract the attention of corporations which have succeeded in other industries. These corporations have the necessary capital resources and professional management skills to overcome many of the problems facing the owner-operator. The earlier successes of such investments in the fast food sector have provided the stimulus for investment in both the established and the newly created table service operations. One of the many refinements being introduced by these corporations is the more extensive use of computer technology in both operational and financial activities.

Background to the Applications of Computers in the Industry

Among the more significant developments in the food service industry in the last three decades have been the growth in franchised fast food outlets, the scope of institutional or "contract" feeding and the role of the specialty restaurant. The earlier introduction of

computers in the first two sectors of the industry are easing their present implementation in the third sector. The fast food chains pioneered the development of data communication networks because of a need to transmit key operating statistics from many thousands of units across the country back to their corporate offices. This communication capability enables the immediate identification of problems and the initiation of corrective action.

The employment of mass-production techniques in large, centralized commissaries has provided such economies of scale to the larger contract feeding organizations that they have been encouraged to invest heavily in computers to process the volume of data involved in menu planning, purchasing, inventories and production scheduling. All of these applications have a certain relevance, on a smaller scale, to the specialty restaurants.

The feasibility of using computers in table service restaurants has been dependent on a number of conditions which have only recently been fulfilled. Following the lead of the fast food operations, table service restaurants have begun to develop a larger economic base by expansion through joint-venture and franchise activities. This development has provided the funds, and often the need, to allow favourable consideration to be given to investment in computer services or equipment.

The typical starting point is a decision to upgrade existing cash register equipment to enable sales data to be captured on magnetic media for subsequent processing at an independent data centre. As volumes increase, consideration is given to installing a computer at the corporate office and automatically receiving restaurant data by

telephone line, for centralized processing and transfer back to the units. At this level of development, the table service chain has completed an implementation pattern which is now well established in the fast food industry. It is important to note, however, that recent developments in computer technology and the potential for additional computer applications have provided table-service restaurants with an alternative implementation plan. The established minicomputer manufacturers have recently introduced microprocessor-based systems at a cost which can justify the installation of a computer at each restaurant site, subject to the following general qualifications:

- a) The company is decentralized, in the sense that the restaurant installations substitute for a centralized computer facility.
- b) The system is used to perform at least the point-of-sale and the accounting functions and, preferably, the seat assignment function.

The rationale supporting the on-site installation of a restaurant computer system can be summarized as follows:

1. A point-of-sale (POS) system, regardless of its level of sophistication, represents an unavoidable expenditure for on-site equipment.
2. The use of a computer facility in any mode (excluding automatic polling and the transfer of manually recorded data) requires the on-site installation of a computer input/output device, such as a teleprinter.
3. If the point-of-sale processor already functions as a general-purpose processing unit, or can be upgraded to this

level, the addition of a data storage device will provide an integrated computer system, capable of handling both the point-of-sale and the data processing applications.

The alternative approaches in the definition of specific equipment relate to the relative cost benefits of extending the capabilities of (a) a conventional POS system--to provide a general data processing capability, or (b) a small business computer system--to provide a point-of-sale capability (by the addition of modular POS devices such as order entry keyboards, displays and check/requisition printers).

To assist the reader in his understanding of the operations described in the following sections, it should be noted that the discussion is based on the approach taken in (b) above. The associated cost/benefits are described in Chapter Six.

The differences in cost for a single restaurant operation, compared to a chain operation, relate to the latter's ability to take advantage of volume discounts on the equipment and to allocate the initial cost of software over a larger number of installations. As the suppliers become more established in the market, however, they will tend to reduce software charges as costs are progressively covered by their original customers. As this trend develops, an increasing potential is provided for even single-restaurant operators to enjoy the benefits described in the following sections.

CHAPTER TWO

POINT-OF-SALE APPLICATIONS

Point-of-Sale Systems

Introduction

From the time of their invention in 1885, cash register functions changed little until the 1960's, when the technology which produced the pocket calculator (i.e., large scale integrated circuitry) was applied to conventional registers to produce the first electronic cash register (ECR). The number of manufacturers proliferated in step with the advances in technology, each attempting to establish a unique position in the market. Many of the more ambitious pioneers have withdrawn from the market because of the formidable development costs and the earlier unwillingness of the retail industry to fully accept the concept.

The restaurant industry is beginning to take advantage of these pioneering efforts in the general retail and supermarket industries. This development has resulted in an unprecedented demand for register systems based on the new technology.

The increasing sophistication of electronic cash registers is obscuring their earlier distinctions from fully integrated point-of-sale systems. At the present time, terminals which are designed primarily as self-contained, locally controlled devices (although they may operate within a centrally based network) should be classified as

electronic cash registers. By contrast, systems which are dependent upon a single, physically-separated central processing unit should be classified as integrated point-of-sale systems. From the user's point of view both systems provide (an order entry keyboard, a display and a receipt printer.) In table service restaurants, a guest check printer is generally provided, and an optional remote requisition printer may be located in the preparation areas. Electronic cash registers tend to have these devices (with the obvious exception of the remote printer) housed in a single unit. Point-of-sale systems, on the other hand, are designed in a modular form which allows each device to be located in only those areas of the restaurant where its particular function is required. One of the inherent benefits of this latter design is the elimination of processor costs at each terminal location. A sample layout of an integrated point-of-sale system is shown in Appendix A.

Rather than providing a technical description of the equipment, the following sections describe the features of an integrated point-of-sale system in terms of the benefits provided to the various users of the system.

Server Benefits

Order Entry

The keyboard of most order-entry terminals consists of three types of key: preset, numeric and function. The preset keys identify each menu item, and are usually grouped and colour-coded by product category to allow easy identification by the server. By depressing a single preset key, the server initiates the following actions:

- a) The menu item description is recalled from computer memory and printed on the requisition.
- b) the menu item price is recalled and printed on the requisition.

If multiple quantities of a single menu are required, the quantity is entered prior to depressing the preset key. This causes the quantity to be automatically extended by the price and printed on the requisition.

An alternative method of order-entry is known as "price look-up". This method requires use of the numeric keys only. A numeric code is allocated to each menu item and displayed at the server station. The menu item is identified by indexing the code rather than a preset key. The price is recalled and extended by quantity prior to being printed. Although a description may also be recalled and printed, it is more typical, using this method, to print the numeric code rather than a description.

A special type of preset key known as an "open" key is usually provided. An open key applies to a product group, or "department", rather than to an individual item and is generally used for entering transfer sales from another department, or non-standard menu items and prices. Sales in these categories are recorded by numeric entry of the price, followed by the appropriate "open" department key.

Function keys, as the name implies, are used to control the operation of the system. An example of a function key used during order-entry is the "void" key. In the event that an incorrect menu item has been entered, the void key can be used in conjunction with the appropriate preset key to reverse the entry. Another example of a

function key is the subtotal key which is used to calculate and display a cumulative subtotal at the end of each requisition. All details of the accounts for each table are held in computer memory until the account is settled.

Re-order

If subsequent orders are to be added to a customer's account, the account details can be recalled by keying a unique code combination of server, table and/or check number. This mandatory procedure ensures that:

- a) servers can enter charges only to the tables to which they have been allocated and to the checks which have been generated against their account, and
- b) previous balances are automatically maintained by system, thus avoiding one of the most common sources of error in a conventional system.

When it becomes necessary to void or credit an item entered on a customer's previous order (due to the item being either unavailable or unacceptable when served to the customer), it is possible to distinguish between a credit involving inventory usage and a credit involving cash only. Such credit functions must be accessible only to supervisory personnel if the level of cash control, to be discussed later, is to be maintained.

Operational Efficiencies

The time involved in the order-entry/preparation cycle is significantly reduced by the use of requisition printers located in

the preparation areas of the restaurant. These printers produce a duplicate copy of an order as it is being entered in another section of the restaurant. The server benefits from not having to physically transfer the requisition to the preparation area, or even to assume responsibility for the transfer being delayed or forgotten. The server can also be advised of any temporary unavailability of a menu item by an error tone and appropriate message on the terminal display. Such input would be entered by the floor manager based on advice from the kitchen.

The more advanced systems are capable of handling customer requests which cannot be determined at the time of initiating an account. Two common requests are referred to as "chaining" and "splitting". Chaining refers to the transfer of a single account from one table to another, either within a department or from one department to another (e.g., lounge to dining room). Complete details of the chained account are assigned to the new table for subsequent settlement.

Splitting an account provides the ability to maintain multiple accounts at a single table. It also allows new guests to join an existing table and to be charged on separate accounts.

Settlement

When an account is to be totalled for presentation to the customer, the POS system automatically performs the following calculations:

- a) the account is subtotalled by depressing the appropriate function key,

- b) various discounts can be calculated by selection of other function keys--to account for sales to employees and special guests,
- c) sales tax is computed, either selectively or on all items, and
- d) the total amount payable is calculated and printed.

After presenting the check and receiving payment, the server closes the account by inserting the guest check in the slip printer and depressing a key indicating the appropriate method of payment (e.g., cash, certificate, credit card type, or nil payment). The latter can be further defined as a promotional meal or a "walkout" (i.e., a party that left without paying). The ability to input such detail at the time of settlement provides considerable time saving in subsequent cash reconciliation. Whenever a split account is maintained, a separate check will be generated for each sub-account. Any combination of tender can be accepted and separate receipts can be generated. A variation of this feature enables progressive settlement of a single account with various methods of payment.

Training

In concluding this section on POS benefits to the server, some comments should be directed to training benefits. Most systems provide a prompting feature, such as illuminated buttons or a single word *take out* on the display, which directs the server to the next operational step. Some systems can be switched into training mode during normal operation without invalidating stored transactions and totals. The most immediate advantage to the new server is the fact that prices do not

have to be memorized and that incorrect operation of the equipment is easily identified. Servers are able to correct their own mistakes by referring to the explicit error messages displayed on the order entry screen.

Benefits to Preparation Staff

The more advanced POS systems include remote printers, located in the preparation areas. These printers produce a copy of the requisition entered at the server station. The most obvious advantage is the elimination of time and effort involved in physically transferring the requisition and the occasional problem of forgetting to make the transfer. It also ensures that the preparation staff have immediate control over all orders as they are entered. The requisitions are much easier to read because (a) they are machine printed, (b) common items are accumulated and similar items are grouped, (c) menu item descriptions, preparation instructions and printing format are standardized. Verbal communication between preparation staff and servers is facilitated by clear identification on the requisition of the server's name, table number and the time of order-entry.

If an order needs to be modified during the preparation cycle, the new requisition references the number of the order to be replaced and highlights the items which have been modified.

Customer Benefits

The primary benefit to the customer is confidence in the accuracy of the calculations--which include prices, previous balances, extensions, discounts, taxes, totals and change. The legibility of a

machine printed check, with common items accumulated and similar items grouped, creates further goodwill with the customer. ✕

Customer service is improved by the reduction of queues at the registers, due to the more rapid order-entry and check settlement procedures. The customer is also less likely to be aware of the presence of the low-profile, low-noise terminals which miniaturized electronics have made possible; it has now become practical to place terminals in the serving areas, so that servers may remain within sight of their customers at all times.

Management Benefits

Sales Improvements

An improvement in sales can be achieved through increases in (a) average check, (b) seat turnover, and (c) the proportion of high profit items sold.

The more advanced POS systems can store far more detail by server than simply the cash totals for which they are responsible. Totals can be automatically divided by the number of meals served to allow on-the-floor monitoring of average check by server. As the system is also used to record on/off times, accumulated man-hours can be automatically divided by meals served, to analyze server productivity. Sales of the higher-profit menu items can be calculated as a percentage of the total sales by server, allowing corrective action to be taken by the floor manager when reasonable standards are not being achieved.

As a further incentive to the staff, "competitions" can be conducted over several weeks based on an automatic accumulation of

performance indicators such as productivity levels and sales of high-profit items.

The system can increase seat turnover by improving server efficiency through the use of remote requisitions at the time of order entry and automatic calculations for faster check settlement.

Cash Control

The first level of cash control is provided by the machine-printed guest check; it is non-erasable and automatically priced, totalled, discounted and taxed. Every transaction, including voids and discounts, is recorded against a check number and stored in memory until the account is settled. Customers also provide an informal auditing function when they verify the contents of the transaction display which is provided on most of the terminals used in a cashier environment. Protection against the deliberate or accidental loss of guest checks is provided by reference to the system-generated account number, which may be used to recall all account details prior to settlement.

To protect servers against other employees entering items on their account (for which they assume liability for collection) each employee can be assigned a secret code number and may even be allocated specific table numbers at the beginning of each shift.

Upon settlement, all transaction details are transferred from computer memory to the mass storage device for subsequent auditing. In the majority of POS systems, all of the totals required for the server's cash reconciliation are retained in memory and provide a complete balance between product revenue, server sales and server

deposits. Voids and discounts are reported by type and totalled by volume and value. This summarized and balanced data facilitates preparation of the daily cash report and provides a level of security that should satisfy on-site operators and absentee owners alike.

Inventory Control

Perhaps the most significant of the recent POS developments is the ability to express each menu item sold in terms of the total quantity of each major ingredient which the menu item contained. This "explosion" of the menu items sold provides a "potential" usage by major ingredient, which can then be matched against actual usage to identify variances caused by variable portioning, excess waste or pilferage.

Actual usage is computed by the system, based on management input of physical counts, purchases, transfers and waste. Variances are reported by quantity to allow for corrective action, and then extended by standard costs for input to the accounting records.

Purchasing requirements are also more accurately determined when they are based on the daily and cumulative sales mix reports produced by the POS system. A more accurate estimate of requirements assists in reducing stock outs, spoilage and holding costs.

The control of liquor inventory has its own unique problems. With the recent advent of electronic dispensing systems, however, a new standard of control has been introduced. The additional control features provided by these systems are discussed in a later section.

Labour Control

The check printer in the more advanced POS systems can be used to record on/off times on employee time cards. The system can calculate the hours worked, extend them by specific wage rates and print a daily labour cost report. Labour costs and sales for a specific time period are often matched and reported as productivity ratios. Employee hours are accumulated for the pay period, and used as direct input for payroll preparation.

Labour scheduling can be improved by the use of a report automatically generated by the system, showing the volume of customer transactions and gross sales for each hour within each shift. This concept can be extended on a computer-based system to provide a daily correlation between the on/off times entered by the service staff and the opening and closing times which are automatically recorded on each guest check. By recording additional information such as weather conditions and day of the week on each report, valuable historical data can be developed for subsequent labour scheduling.

Table Status Systems

Introduction

Table status or seat assignment systems are a recent innovation in the restaurant industry.

Self-contained, or "stand-alone" table status systems are based on a master panel at the hostess station which displays the floor plan of the restaurant, with tables identified by display lights. These lights can be illuminated by the bussing staff from a remote station to indicate table availability to the hostess.

Integrated table status systems are based on a video display screen at the hostess station which can be used for more comprehensive information on the table status than is available in the stand-alone system. Integration with the POS system enables the automatic transfer of scheduling information, such as the time at which each check is opened and closed. The hostess uses the system to record the names of waiting patrons. A schedule of their movement through the restaurant is maintained for immediate recall. The following sections describe the benefits provided by an integrated table status system.

Staff Benefits

The seat assignment function is designed to distribute the flow of guests evenly across all sections of the restaurant. Service staff are relieved of the load often placed upon them in a conventional operation when an inexperienced hostess fills their section with new

guests rather than distributing them among all sections with available tables.

Because of the improved flow of customers through the restaurant, the kitchen staff benefit from a more regular distribution of preparation effort. The hostess also becomes more effective because she no longer has to walk through the restaurant in order to determine the status of each table.

Customer Benefits

On arrival at the restaurant, customers can be given a reliable estimate of the time at which they will be seated in the dining room. Although customers can enjoy this benefit at restaurants which accept reservations (on those occasions when the preceding turn is slower than expected), the greatest advantages are experienced in restaurants with a no-reservation policy. In these situations customers waiting in line can be scheduled for specific tables in the holding lounge and the dining room. Re-scheduling can be performed automatically whenever actual durations vary from predetermined averages by a specified percentage. Customers can then be advised of any significant changes in estimated waiting time.

Customers in the holding lounge can be given advance notice of the availability of their dining room table, based on check settlement by the previous party. Such notice allows them the choice of leisurely finishing a drink or settling their lounge check before moving to the dining room.

Requests for specific tables or special table arrangements can

be more readily accommodated because the hostess has immediate access to expected availability times on all tables.

In a conventional operation, the hostess often relies on her estimate of the time required for tables to be bussed, which occasionally results in customers being shown to unbussed tables. In an integrated system the person responsible for bussing the table provides the input which confirms the table availability.

Management Benefits

The primary benefit of a table status system is its effectiveness in increasing sales. Tables are turned faster because the system reduces the normal time interval between the table being vacated by one party and occupied by another. An improvement in seat turns is also experienced because the system more effectively matches party size to table capacity.

The initial effect of this improvement is experienced by the customer at his first point of contact with the restaurant, which is more commonly becoming the waiting line. If the customer can be given a reliable estimate of waiting time, the benefits are two-fold; it reduces the possibility of (a) his deciding not to wait because the hostess has over-estimated the waiting time, and (b) his not returning to the restaurant again because the hostess under-estimated the waiting time.

As a by-product of using a computer to perform this scheduling task, management can be provided with summarized statistics which include turnover by seat, table and server, average duration by party size, table occupancy ratio, server response time and hostess seating efficiency.

Although the system is primarily justified on sales improvement, cost savings can be expected from a reduction in the hostess staffing level because the hostess need not visually confirm that tables are ready for seating.

Introduction

Automatic liquor dispensing systems have been developed in recent years which create the automatic dispensing of liquor. These systems are designed to be installed in bars, restaurants, and other establishments where liquor is served. The systems are designed to be installed in such a manner that the hostess need not visually confirm that tables are ready for seating.

There are two basic systems to be distinguished. The first system is the automatic dispensing system. This system is designed to be installed in such a manner that the hostess need not visually confirm that tables are ready for seating. The second system is the automatic dispensing system. This system is designed to be installed in such a manner that the hostess need not visually confirm that tables are ready for seating.

The automatic dispensing system utilizes a number of valves which are controlled by a hostess. The hostess can select the type of liquor to be dispensed and the amount to be dispensed. The system is designed to be installed in such a manner that the hostess need not visually confirm that tables are ready for seating.

Liquor Dispensing Systems

Introduction

Automatic liquor dispensing systems evolved from the same technology which created the electronic cash register. Their general introduction lagged by several years, however, because of the amount of specialized equipment required to remotely store the liquor and transfer it to the dispensing station.

There are two basic systems to be distinguished. Integrated systems are so named because the use of an electronic cash register is integral to their operation; the only means by which drinks can be dispensed is by depression of the appropriate key on the ECR. Glasses must be placed under a single pouring head from which the drinks for a particular order are dispensed. The system has the capability of dispensing all of the items in the liquor inventory, and combining them according to pre-programmed cocktail recipes.

The stand-alone systems utilize flex-hoses or touch-faucet consoles to dispense a maximum of twelve brands of liquor and up to three cocktails based on these brands. Although these systems can be interfaced to electronic cash registers to enable a drink to be automatically registered as it is poured, such interfaces are generally not implemented because of the difficulty in operating a pre-check system with a partially automated liquor system.

The benefits described in the following sections are based on the use of integrated systems which are the only systems that can be regarded as computer-driven devices.

Management Benefits

Labour Control

The improvement in staff productivity resulting from the installation of an automated liquor system is experienced in a variety of areas. Drink dispensing speeds are increased significantly, with the degree of improvement varying according to the type of system employed. The number of pouring stations in multi-station lounges can therefore be reduced, with a consequent reduction in the number of bartenders required. In single station operations, the number of extra staff required for peak volume periods can also be reduced. Subsidiary benefits are also incurred. Firstly, some relief is provided in the increasingly difficult search for experienced, non-transitory bartenders. The required skill level, and therefore cost of those hired for an automated bar is generally less than that required in a conventional lounge. It follows that staff working in other departments who are transferred to the lounge are more easily trained for their new duties. In larger operations the faster preparation of drinks means less waiting time for cocktail waitresses, with a consequent saving in either the number of waitresses scheduled or the average hours worked by each waitress.

The back office staff also save time whenever inventories are to be restocked or counted because all product is stored and dispensed directly from a single stock room.

Sales Control

Sales volume is increased and customers experience faster service because of the reduction in server-dependent waiting time and the increase in seat turnover. The design of the equipment ensures that all sales are recorded before any liquor is dispensed and that adequate detail is stored to allow subsequent analysis of sales by server and sales by beverage category.

Cash Control

A cash bar operation is more vulnerable to petty theft than any other area of the restaurant. Bartenders use "under-rings" to record a lower sale, having accepted the correct amount from the customer and kept the difference. Conversely, a sale may be overcharged by recording a higher price or extra items on the customer's copy of the bill. The overpayment is collected, the correct amount is registered and, again, the difference is kept by the server. The most blatant abuse is, of course, the collection of exact cash for drinks which are dispensed but never recorded.

None of these techniques can be successfully employed with the computer-controlled dispensing systems now available. All drinks are automatically priced, mixed and dispensed by depression of the appropriate register key. Recorded sales therefore balance with actual sales which, in turn, balance with receipts, because servers are required to submit exactly the amount which the system has accumulated on their account. In those operations which employ multi-pricing levels for happy hour or entertainment periods, adherence to the

appropriate price level is enforced because all prices are preset and the switching of the system from one price schedule to another is under management control.

Inventory Control

The most significant benefit provided by liquor dispensing equipment is the ability to measure and dispense an exact portion size. Bartenders are therefore prevented from overpouring to ingratiate the customer in the hope of higher tips, or from underpouring for "pick-ups" (i.e., if the standard shot size is one ounce, three full shots represent the same product usage as four 3/4 ounce shots. The bartender is able to retain the revenue from the fourth shot without changing the percentage cost to sales, which is typically the method by which their performance is measured. In those operations where the portion size is varied during happy hour or entertainment periods, a revised set of drink recipes can be invoked on the dispensing system, under management control.

The traditional methods of buying and storing liquor can also be revised in favour of reducing product cost. Under a manual system, liquor is typically bought in 25 ounce bottles because licensing regulations state that liquor must be dispensed from the bottle in which it was purchased. An automated system allows liquor to be purchased and dispensed from half gallon bottles with consequent savings in product cost. As all bottles are rack-mounted in an inverted position the average half ounce per bottle which is normally lost, by replacing less than fully-drained bottles, is eliminated. As no bottles are handled at the dispensing station, the cost of spills and breakage is also virtually eliminated.

The opportunities for product theft in a conventional bar are well documented; they include direct removal, stock dilution and the sale of private product. An automated system will eliminate these opportunities at the dispensing station and localize them to the stock room, which can be more readily kept under strict management control. Holding costs are also minimized by stocking inventory at a single location rather than maintaining a separate inventory for each bar.

Customer Benefit

A noticeable improvement in customer goodwill is experienced because of faster service, the consistent quantity and quality of the beverages served and their confidence in the accuracy of amounts charged.

CHAPTER THREE

MANAGEMENT ACCOUNTING APPLICATIONS

Food Cost Control

Introduction

Food cost control can be divided into two primary functions: (a) the standard accounting function which is concerned with the value of merchandise at various points in the cost cycle, and (b) the management control function which deals with the components of the merchandise value in greater detail. The basic accounting function has been fulfilled once the value of the raw materials and finished goods has been established. If the relationship between cost and sales is unsatisfactory, however, the control function is required to identify the underlying problems. In a commercial kitchen, such problems include spoilage, wastage, shrinkage, pilferage, yields, portioning, specifications, price variances and collusion.

All of these problems can be controlled under a manual system, but the cost of enforcing such control on a continuous basis is usually higher than the resulting benefits. The following section describes the application of a computer-based system in achieving these benefits at a realistic cost.

Menu Planning

The menu is the starting point in planning a restaurant operation. To ensure successful implementation, it must address the expectations and constraints imposed by the target market, the production facilities of the restaurant and the profit goal set by management.

The use of computers in researching potential markets for taste preferences, eating patterns and the supply of prime ingredients is beyond the scope of this report. This section will focus on the financial aspects of menu planning and, in particular, the benefits to be gained by the use of computers in this application.

Computers have made the "pre-cost, pre-control" food and beverage system a practical consideration for operations much smaller than those for which it was originally designed. At the lower end of the scale, the procedures can be implemented on programmable calculators and expanded to time sharing or on-site minicomputers as higher volumes or the need for greater flexibility are experienced.

At the point of computer application, it is assumed that the market and production constraints have been fully considered and that a draft menu has been prepared. This implies that recipes have been prepared for all menu items and approximate costs have been established. Computer usage is introduced at this stage to more effectively process the large number of revisions involved in producing a final menu.

A code structure must be developed to cover all raw ingredients and the products which management intends to semi-process for subsequent use in a final product. The recipes themselves must then be coded, with the semi-processed items or "subassemblies" acquiring a cross-referenced ingredient code.

Data input formats are prepared for the recording of every relevant ingredient detail. Three levels of units must be specified: (1) the order unit in which the product is normally purchased, (2) the inventory unit in which the item is counted, and (3) the recipe unit in which the item is prepared. The factors required to convert one unit to another must also be calculated and recorded. The current order unit price must then be applied. The computer can be used to edit this data for any duplications or inconsistencies and then print a stockbook, in inventory code sequence, which displays the original input data, together with inventory and recipe unit prices, based on the conversion factors provided.

The next step involves the matching of recipe codes with inventory codes, which, in this context, are referred to as ingredient codes. The ingredient input format also specifies the quantity required for the recipe and a code defining the unit in which this quantity is specified.

The system has now been supplied with all of the information required to pre-cost the recipes. The labour costs involved in food preparation are only accounted for at the planning stage if significant variations exist in the preparation time of the various recipes. The report specifications for the costed recipes should include the proposed selling price, and the gross profit and cost as a percent of sales. Alternatively, a standard cost percentage can be provided for calculating a rough selling price which can then be refined for market acceptance.

In order to establish a weighted estimate of the sales, cost and gross profit which will be generated by this draft menu, it is

necessary to apply a projected sales mix factor to each menu item, which should reflect its relative popularity. The computer will extend the individual selling prices, gross profits and costs by these factors to determined the same values for the complete menu.

Management must now decide which adjustments, if any, should be made to provide a more acceptable food cost percentage. The variables include portion size, ingredient substitution, menu item substitution and selling price. Although this function requires full management involvement, the computer plays a significant role in simplifying the computation of the weighted menu food cost each time a new set of variables are to be tested.

Purchasing

A systematic approach to purchasing is probably the most important determinant of optimum food costs. A purchase control system must balance inventory holding costs against out-of-stock occurrences, low prices against acceptable product specifications and order quantities against delivery lead times.

In a typical manual system, all of these factors and their interactions are established and refined by management over many years. The system is very dependent on key personnel for its efficient operation. A computer based system is designed to relieve this dependence on past experience by recording all relevant data and documenting all procedures.

The purchasing cycle involves a determination of: (1) the items to be purchased, (2) the quantity (as a function of the delivery

interval), and (3) the supplier (based on price and product specification). The computer can provide considerable assistance at each step within this cycle.

Ingredient purchases can be calculated to a level of accuracy which exactly matches the projected sales by menu item. As the computer has been provided with details of all ingredient quantities by menu item, the "explosion" of these quantities by projected sales presents the computer with a simple task which, under manual methods, would be so laborious as to be impractical. Typically, only key ingredient purchases are calculated using this method, with all other ingredient quantities being based on comparison against par stock levels. In either a manual or computer-based system, an adjustment must be made for stock on hand in excess of the minimum stock level. Such adjustments can be made more accurately within a computer system because the book inventory is always current.

Having established the items and quantities to be ordered, a supplier must be chosen based on price, quality and delivery time. Excluding items purchased on contract, which are subject to different controls, the food manager should have access to the price lists of at least three primary suppliers. Although regional data banks containing such information are not yet established for public access, the larger restaurant chains are experimenting with internal systems designed to provide access to this facility via a computer terminal at each restaurant location.

A significant feature of computer-based systems is the immediate input of the quantity and price of every invoice item. These entries are used to update inventory records and to report on all

price increases above a predetermined percentage. The food manager is thus given the earliest possible warning of the need for corrective action. To assess the effect of an increase in a commonly used ingredient, he may decide to run an Ingredient Occurrence Report which would advise him of the menu items affected.

As the volume and magnitude of price increases accumulate, a periodic decision will be made to recost the entire menu, resulting in an increase in the price of certain items and the replacement of others.

By relieving management of the tedious calculations involved in the conventional purchasing function, a computer-based system allows managers to devote more of their time to true management functions.

Inventory

The restaurant inventory application involves three functions: receiving, storing and issuing. Standard receiving procedures require that all products are inspected at the time of delivery. Quality is checked to ensure that it conforms to specifications and quantity is checked to ensure that the amounts ordered, delivered and invoiced are consistent. These are essentially manual function. Once the goods are physically received, however, a computerized approach to the recording of receipts and issues will ensure that the records are always current and accurate.

Issues from stores will be determined by the explosion of projected sales and confirmed by regular physical counts. Key ingredients are usually counted daily, with the remaining items being counted weekly or monthly depending on their unit value and turnover ratio.

Based on the three unit levels which were established for each inventory item during the menu planning phase, the computer can provide a printed inventory sheet on which to record physical counts. The advantages provided by this approach are: (1) the assurance that all items in stock are listed, because the computer report is based directly upon purchase records, (2) the unit of count is standardized, and (3) the specified unit price relates to the standardized inventory unit and is the most recent price paid for that item.

When the counts have been recorded, the inventory would normally be extended and totalled manually. However, the inventory sheet can be formatted to include additional columns for the manual recording of opening inventory, receipts and waste--from which the potential quantity used can be computed. If this option is taken, it is more practical to identify the count by inventory item code, input the code and count for each item, and allow the computer to calculate quantity usage and closing inventory value by item.

A final point should be made in regard to the ease of referencing computerized inventory records. As a result of the computer's ability to quickly reorganize volumes of data, inventory records may be sorted to provide a direct reference to alphabetical listings by item, brand, manufacturer or supplier.

Food Preparation

The production operation involves four separate functions: recipe sizing, ingredient assembly, cooking, storage or serving. The computer offers time and cost-savings benefits in the sizing and assembly functions.

Recipe sizing is generally the responsibility of the more experienced and highly paid kitchen staff. In theory, it involves the extension of every ingredient in a standard recipe by the particular multiple of the standard quantity which has been scheduled for production. Because of its tedious nature, it usually falls victim to short-cuts and gross approximations. Ingredient quantities are usually based on even multiples of the standard yield quantities, and are then rounded to the nearest inventory unit level, with the excess product invariably finishing up in the "standard" recipe. Ingredient assembly, even when the exact quantities have been specified, is often approximated for similar reasons.

The benefits which a computerized system provides, in addition to the exact sizing of each recipe, relates to its ability to combine the quantities of all common ingredients and provide a consolidated picking list. This list can also show the distribution of each ingredient quantity by the recipes in which it is to be used.

Although such output encourages a greater conformity to standards, the only means by which it can be ensured is to completely separate the responsibility for sizing and assembly from the preparation function. Kitchen inventories are thus eliminated and the cooks have access only to the exact quantities required for the daily production. Such procedures are appropriate only in the larger kitchens where the additional cost of control can be justified by larger potential savings. In these environments, computers can also be used, cost-effectively, to produce production and staffing schedules.

Cost Accounting

Food cost accounting is interdependent with all of the function described in the preceding sections. Cost accounting and control can be performed at three, successively more detailed levels, referred to as the percentage, pre-cost and quantity approaches. At the simplest and most common level, a percentage system is employed to relate costs to sales. Although such systems usually provide analysis by food category, they cannot take sufficient account of sales mix within each category to enable identification of the items which are causing unacceptable variances.

A standard, or pre-cost system, as described in the Menu Planning section provides a more effective control by identifying the actual differences between projected costs and actual costs. The effect of sales mix variances can be isolated by extending standard portion costs by both planned mix and actual mix. However, variances by key ingredient are still difficult to identify because the same ingredient is often used in a number of menu items.

The most definitive approach is to use sales explosion to determine the potential usage of at least key ingredients, which can then be compared with the actual quantities used, as determined by daily inventory counts. This quantity approach eliminates the possibility of errors due to price variances and focuses control on the cost of the inventory items which are most affected by pilferage, waste and over-portioning.

Having reviewed the percentage, pre-cost and quantity approaches it can be seen that the price of improved control is increased

paperwork. To be effective, each approach relies on frequent inventory counts. The time interval between counts can be extended in the larger operations where storeroom requisitions are enforced, because the requisitions can be used to approximate actual usage, assuming that storeroom theft is negligible.

As increased paperwork has been identified as the major barrier to improved cost control, it becomes evident that the application of computers will not only reduce the computational effort, but also improve the speed with which reports are generated for management action.

Labour Cost Control

Introduction

Labour costs in the restaurant industry often run a close second to product costs. Unlike food and beverage costs, however, the level of expenditure is more discretionary because of the relatively wide range of service levels that can be provided to patrons. Even when the service level has been established, external variables such as the weather or competitive activity can cause excessive costs to be incurred.

The operational efficiencies provided by a point-of-sale system were described in an earlier chapter. Such benefits only attain relevance, however, when the demand for service approaches the service level provided. The following pages describe the application of a computer in helping to achieve such a balance.

Labour Scheduling

The traditional method of analyzing labour costs and projecting requirements is based on the calculation of labour costs as a percentage of sales. Although useful, it is limited in that it shows only the relationship between labour costs and sales, which can vary for reasons unrelated to productivity. Revenue is not necessarily a constant indicator of volume, because menu price increments will have the effect of increasing it. Similarly, labour costs are not a constant measure of the labour resources employed because wage increases,

the inclusion of sick and/or vacation pay, or the payment of overtime premiums also have the effect of increasing them.

Percentage costs are typically calculated over a week or a month, with the result that daily discrepancies from standard often balance out. However, the days on which variances are either too high or too low should be identified; preferably, as the problem develops so that corrective action can be taken. It should also be noted that even low percentages are not necessarily desirable, since they may indicate that there were not enough employees on hand to provide the appropriate service and to minimize lost sales opportunities.

An additional problem with the percentage approach is the inability to provide a comparison between operations which offer a similar menu, but differ in their use of convenience foods, their layout and cooking facilities, or in the level of services provided.

To increase their usefulness, percentages can be calculated for the major labour categories. A typical breakdown may include administration, dining room service, lounge service, bar and kitchen. The costs for each category can be calculated as a percentage of sales or as a percentage of the total labour cost. The analysis can be further refined by splitting the categories into job positions, but at this point, the cost of these calculations, in a manual system, tends to outweigh the benefits to be gained.

A preferred alternative is to define a number of productivity ratios and determine their usefulness in a particular operation. A selection of the following ratios could be used for this purpose.

By Employee Category:

By Service Department:

Sales per manhour

Sales per labour dollar

Manhours per meal

Sales per meal

Manhours per seat

Sales per seat

Labour dollars per manhour

Labour dollars per meal

Labour dollars per seat

Meals per seat

For a single operation, the usefulness of these ratios would have to be validated over a considerably longer period than in a chain operation where the input from a large number of units could be provided in a single time period.

The benefit of computer processing in the latter situation is readily apparent. A brief description of a labour analysis project conducted by a locally-based restaurant chain will illustrate the potential for computer application in this area.

The company operates a chain of 36 table service restaurants throughout Canada and the United States. Variable labour costs are monitored against an historically established standard, measured in cents per meal. Because of the differing labour markets in which the company operates, these standards were being continually challenged, particularly at the restaurant level. Consequently, a decision was made to re-evaluate performance measurements and to establish how they could be more effectively incorporated into the company's profit planning activities.

A representative sample of twenty restaurants were issued with data sheets onto which selected details from two months' operations

were recorded. The data required for the analysis was defined as follows:

1. Number of seats in the dining room and the lounge.
2. Average wage rate by employee category.
3. Daily meal volume.
4. Daily sales of food, wine and liquor.
5. Daily manhours by employee category.

The initial project evaluated the usefulness of a simple ratio analysis. A series of productivity ratios were identified and from these the following were selected:

1. Service department manhours per 100 meals.
2. Kitchen department manhours per 100 meals.
3. Lounge department sales per manhour.
4. Total sales per manhour.

An examination of the results showed an unacceptable variance between restaurants in the ratios computed for comparable meal volumes. Therefore, it was decided to proceed with a statistical analysis of the data.

An examination of the data, using the Statistical Package for the Social Sciences (SPSS), showed a strong variance by day of the week. The data was therefore subdivided into three daytypes (Monday - Thursday, Friday and Saturday, Sunday) and a series of multiple regressions were performed for each employee category and daytype combination. The model used for the kitchen and service staff took the form:

$$y = a_0 + a_1z + a_2x + a_3x^2 + a_4x^3$$

where y = dependent variable

= daily manhours by labour category

z = number of seats in the dining room

x = daily meal volume

a_0, a_1, a_2, a_3, a_4 = regression coefficients

The following model was used for the lounge staff:

$$y = a_0 + a_1z + a_2x$$

where y = dependent variable

= daily manhours by labour category

z = number of seats in the lounge

x = daily liquor sales in dollars

a_0, a_1, a_2 = regression coefficients

The factors yielded by the regression analysis were used to compile standard labour tables designed to be used as a scheduling tool at the restaurant level. These were formatted as a series of reference tables which showed for each of the three daytypes:

1. Service and kitchen manhours by employee category for meal volumes in the range 101 to 500, in increments of 20.
2. Lounge manhours by employee category for liquor sales in the range of \$1-2,000 in increments of \$100.

The above manhours were then extended by average wage rates for each employee category to produce the same set of tables showing costs rather than manhours. These standards tables are used in compiling weekly labour schedules and labour variance reports.

In order to eliminate the time involved in referencing the standards table, a computer model was developed. This program required the input of the projected daily meal volume and liquor check, and produced a report providing a daily breakdown, for one month, of standard hours and costs by employee category--with department totals and the daily total split into their variable and fixed components. The projected manhours can be transferred directly to the weekly labour schedule. The model provides a more accurate estimate than the standards table because the hours and costs are applied as stated, rather than being interpreted as the mid-point of a range, and the fixed component is based on the actual seating capacity for each restaurant.

CHAPTER FOUR

FINANCIAL ACCOUNTING APPLICATIONS

Introduction

The basic accounting functions are the traditional entry point for the application of computers in a business environment. A multitude of packaged programs are available for accounts payable, accounts receivable, payroll and general ledger. As these activities account for the majority of the clerical effort in restaurants, substantial labour savings can be achieved by computerization. As the trend continues towards more general-purpose processors in the point-of-sale systems, the possibility of expanding these systems to process the office functions becomes more practical. The following pages highlight some of the potential benefits of this development.

Accounts Payable

As in the manufacturing industry, the interaction of accounts payable with the purchasing and inventory functions follows the flow of a restaurant's product cycle. The benefits of computerizing these associated functions were described in an earlier section. The automation of the payables system is not only a natural extension to these functions, but is a concept which is justified in its own right. A computerized payables system can automatically calculate discount amounts, discount dates and final payment dates, using the invoice

date and the vendor's standard credit terms. Duplicate payments can be eliminated by an automatic check for duplicate invoices at the time of data entry.

The operation of a standard costing system is simplified because the variance between standard and purchase cost is automatically calculated and posted to the appropriate variance account. An automated system can retain historical information by vendor, such as performance and price trends, which can be used to optimize purchasing power. Audit reports can identify any invoices that are not covered by purchase orders and any payees who are not listed on the vendor master file. All of the above benefits are an extension of the primary functions of recording invoice details and printing suppliers' cheques and remittance advices.

Accounts Receivable

Since payment at the time of service is the general custom within the restaurant industry, the accounts receivable application is limited to established credit card accounts and, in the case of chain operations, inter-company accounts. The justification for automating this application is generally based on the desirability of implementing a fully integrated system once the decision has been made to automate the other accounting functions.

Payroll

The restaurant industry is characterized by a high turnover of staff and a high percentage of casual employees. Special requirements are imposed upon both employees and employers regarding accounting for

gratuities and discounted meals. Because of the varied experience of employees and their degree of contact with the public, management can benefit by incorporating personnel information such as job history and language skills in the basic payroll records.

All of these special requirements are better provided for in a computerized payroll system. Even the standard benefit of inputting only essential data, such as employee identification, hours worked and departmental distribution, assumes greater significance when dealing with a large number of casual staff. The computer also provides output which includes labour distribution reports, periodic government reports, payroll registers, cheques and payslips, and bank reconciliations of cashed cheques. Computer reports permit presentation of the above information in a compact, legible format.

General Ledger

Having described the relative benefits of automating the restaurant's subsidiary ledgers, computer processing of the general ledger is a natural and efficient means of integrating the entire accounting function. The peak workloads caused by financial statement preparation are substantially reduced by techniques such as the automatic generation of recurring entries. Restaurant managers are thus able to make decisions on the basis of more current information. If the operation uses a computer to calculate food, beverage and labour costs, an abbreviated income statement could be produced daily by using normal percentages or prorated values for subsidiary costs. The preparation of consolidated statements is simplified. Budget, year-to-date and year-to-year comparisons are automatically provided, and

percentage calculations are completed without error or additional clerical effort.

One of the more interesting enhancements is the input of operating statistics, such as manhours by employee category; the system can combine them with the financial information and compute key operating ratios for comparison against standards. The next chapter will examine this proposal in greater detail.

CHAPTER FIVE

FINANCIAL ANALYSIS APPLICATIONS

Introduction

The financial analysis of a firm is undertaken by management to allow a more comprehensive evaluation of financial performance and to bargain more effectively for external financing. The relationship between various items, both within a financial statement and from one statement to another, are compared against past performance and future goals. Unpublished financial information and non-accounting data are also used in a comprehensive analysis. Forecasting techniques are employed for the preparation of budgets based on such analysis.

All of these activities are gradually being adopted at the small business level. They assume particular significance in the restaurant industry, however, because of the industry's relative high failure rate. One of the obvious barriers to a more general acceptance of financial analysis has been the volume of data manipulation required. The following pages provide a summary of the techniques involved and the computer's contribution in overcoming the data handling problem.

Profit Planning

The preparation of a profit plan is based on an analysis of the historical statements of income and expense. The profit plan is a projection based on the identification of historical trends and an assessment of the effect of future plans and events.

In the restaurant environment, the primary issues are (a) meal volumes, and (b) the split between fixed and variable costs. Historical trends in meal volumes can be significantly influenced, on a daily basis, by weather conditions and, on a monthly basis, by competitive activity. Several costs, in particular, staff labour, are difficult to split into their fixed and variable components. The labour project, described in Chapter Three, provides a solution to the latter problem. The use of a computer to forecast meal volumes is a planned extension of the labour project and will have a significant impact on the accuracy of the total profit planning activity of the firm involved.

Having established meal count as the major volume variable, the forecasts on variable costs can be expressed in terms of dollars per meal and compared against actual performance calculated on the same basis. By removing the volume variable, closer attention can be directed towards the other factors causing unacceptable variances between planned and actual performance.

A typical profit plan for a restaurant could comprise 150 items of input data and subtotals for each month--or approximately 2000 items for the full twelve month plan. The use of a computer in compiling and updating this volume of data, and for computing monthly

variances between planned and actual performance, places a high priority on this activity in terms of its potential for computer application.

Ratio Analysis

Financial statement analysis was introduced as a formalized procedure towards the end of the 19th century for the purpose of evaluating the solvency position of prospective borrowers. The concept was expanded in the 1920's by the Du Pont Corporation with the identification and implementation of a comprehensive series of financial ratios with which they monitored all facets of their operations.

The traditional techniques have involved the analysis of ratios from an historical perspective within the firm (time-series analysis), from a contemporary comparison against the established industry standards (cross-sectional analysis) or against absolute standards, such as a 2:1 value for the current ratio. These approaches have typically involved the comparison of a single ratio or a series of ratios, each considered individually (univariate analysis).

Traditional financial statement analysis has tended to lose favour, however, because of its failure to keep pace with the developments in related disciplines. This has led Horrigan to comment that "...the subject of ratio analysis is replete with untested assertions about which ratios should be used and what their proper levels should be."¹

¹ J.O. Harrigan, "A Short History of Financial Ratio Analysis." The Accounting Review 43 (April 1968): 294.

A feature that characterizes the use of ratios in the restaurant industry is the extent to which non-accounting data is used as a variable in ratio calculations. Operating ratios are used to determine seat turnover, sales per seat, sales per manhour and manhours per meal. In common with general industry, restaurant operations will benefit from the new approaches being developed in financial statement analysis. Because of the more advanced analytical techniques being employed, the computer is providing solutions to the problems inherent in the traditional approaches, some of which are documented below. Univariate analysis is being replaced by multivariate analysis to account for the interdependencies between various ratios and to avoid the ambiguity resulting from different ratios producing conflicting inferences. This development involves the formulation and verification of statistical models.

Statistical methods such as factor analysis can be used to screen a large number of ratios and choose the most appropriate ones for further analysis. Whenever a high degree of correlation is established, a smaller number of ratios can be used to convey the essential information.

Rather than using simply the mean of the standard industry ratios for cross-sectional analysis, the dispersion, as measured by the standard deviation, can be used to provide an improved set of standards for interfirm comparisons.

Statistical models for the prediction of corporate failure have particular relevance to the restaurant industry. Computers have been used in the development of such models based on both regression analysis and multiple discriminate analysis techniques. The effectiveness

of these models have been commented on by Lev: "It appears that well-specified financial models (of the multi-variate type and probably including non-accounting as well as accounting variables) are capable of providing an early warning at least two to three years before bankruptcy."¹

Efforts must now be made to formulate and verify similar models in the broader spectrum of restaurant financial analysis.

Cost-volume-Profit Analysis

CVP analysis is a simplistic method of introducing and using the techniques described in the next section. It involves the manipulation of five basic variables (sales volume, selling price, variable cost, fixed cost and profit) to determine the degree of interdependency between each variable. CVP analysis is best used as a screening device in the planning and forecast phase of project development.

The technique involves both a graphic and algebraic form of expression. The graphs define the framework and general parameters and the formulae assist in decision-making within this framework. As a means of relating the technique to the next section, the approach is presented in the form of a computation schematic in Appendix B.

Although computers have been used to implement the CVP analysis, a rapid progression towards a more comprehensive model is usually experienced because of the computer's ability to overcome some of the limitations of the CVP analysis, as noted below.

¹ Baruch Lev, Financial Statement Analysis: A New Approach, (Englewood Cliffs, N.J.: Prentice Hall, 1974), p.151.

CVP analysis is based on the concept of a relevant range in which costs and revenue are linearly related to volume. This range is generally defined as + 15% from the projected volume level at which accurate data can be provided. Although values outside this range are disregarded, the pertinent issue is the validity of the linear relationship within the chosen range. In the restaurant model the relevant cost/volume relationship is Variable Operating Expenses per Cover and Number of Covers.

Difficulty is often experienced in accurately apportioning revenue, and especially, costs into their fixed and variable components --labour being a prime example. Joint costs also present difficulties when they cover a number of departments which have to be analyzed separately. Finally, variations in sales mix between, for example, high and low contribution menu items, will distort the linear relationship between volume (number of covers) and variable sales revenue.

Because of the above limitations, further discussion will be reserved to the next section where the application of computers assumes more relevance.

Sensitivity Analysis

The concept of sensitivity analysis was introduced on the previous page. When the CVP concept is expanded to include all of a company's financial variables, it becomes a more useful computer application.

Sensitivity analysis is typically carried out at an on-line terminal to allow direct interaction with the computer. The user

"experiments" with the model by using an "if-then" approach in testing the effects of optimistic and pessimistic forecasts. Although the risk factor involved in these forecasts is not explicitly taken into account, the technique has the advantage of being readily understood by the restaurant executive who may otherwise feel unqualified to use a risk-oriented approach to financial modelling.

CHAPTER SIX

COST BENEFIT ANALYSIS

Summary

The material presented in this chapter is as much the presentation of an approach to cost/benefit analysis, as the justification of a particular computer system. A deliberately conservative approach has been taken in quantifying the benefits, and no attempt has been made to list many of the smaller benefits referred to throughout the text.

The costs are based on actual quotations submitted to a Vancouver-based restaurant chain. The related hardware and software was fully defined and specified as part of the vendor's contract.

The summary of costs and benefits specified in Tables II and III indicate a potential net benefit of approximately \$300 per month from a single unit operation and \$2100 per unit per month from a 40-unit chain operation. Depending on the method chosen to finance the investment, the tax advantages related to capital cost allowances could further improve these net benefits.

A survey of the five largest full-service restaurant chains in Canada revealed an obvious "wait and see" attitude towards point-of-sale systems, and an acknowledgement that in some cases, at least, the unit-level accounting functions were being processed in batch mode on a centralized basis. However, the largest chain in the survey did

acknowledge that they were about to commit for a microcomputer-based point-of-sale and full accounting system to be installed at each restaurant beginning in September, 1979. It is expected that this move will precipitate a commitment from at least some of the other chains and larger franchisee groups, commencing in 1980. As many of the chains have already installed a centralized computing facility, however, the present Canadian market for the systems described in this report comprises the smaller chains and the single unit operations with volumes similar to those specified in the following tables.

Sales Improvement

Increase in Average Check	\$ 432	
Increase in Seat Turnover	441	
Improvement in Sales Mix	431	1,304

Cost Reductions

Food Costs	453	
Liquor Costs	220	
Labor Costs - operations staff	243	
Administrative	213	1,129

		\$ 1,025

TABLE II

POTENTIAL INCREASE IN NET PROFIT

	<u>Potential Monthly Increase in Net Profit</u>	
<u>Sales Improvement</u>		
Increase in Average Check	\$ 483	
Increase in Seat Turnover	441	
Improvement in Sales Mix	453	1377
	<hr/>	
<u>Cost Reductions</u>		
Food Costs	498	
Liquor Costs	226	
Labour Costs - operations staff	245	
- clerical	713	1682
	<hr/>	
		<hr/>
		\$ 3059
		<hr/>
		<hr/>

TABLE III

<u>COST OF COMPUTER SYSTEM</u>				
	<u>Single-Unit</u>		<u>Forty-Unit</u>	
	<u>Operation</u>		<u>Chain Operation</u>	
Hardware (1)	33,700		33,700	
Volume Discount (2)	<u>-</u>	33,700	<u>10,110</u>	23,590
Software:				
- total (3)	70,000		70,000	
- per unit		<u>70,000</u>		<u>1,750</u>
Sub-Total per unit		103,700		25,340
Lease Financing Cost per Month (4)		2,385		583
Hardware Maintenance (5)		337		337
Total Cost Per Unit		<u>\$ 2,722</u>		<u>\$ 920</u>

NOTES:

- (1) Hardware comprises:
- | | |
|---|------------------|
| Small business computer (DG Micro Nova) | \$ 19,300 |
| Point-of-sale terminals (DCC Provider) | 14,400 |
| | <u>\$ 33,700</u> |
- (2) Volume discount amounts to 30% of the list price for hardware deliveries at the rate of one per month.
- (3) Software cost includes the design, programming and implementation of the point-of-sale, management accounting and financial accounting systems.
- (4) Lease costs are estimated at \$23 per \$1000.
- (5) Hardware maintenance costs are estimated at 1% of the hardware costs per month.

Sales Improvement

Introduction

A standard approach has been adopted in quantifying the benefits discussed in this chapter. Rather than attempting to predict a specific level of improvement from a varying range of contributions, a conservative, five-level range of improvement has been proposed. In order to reduce this range to a single value, the probability of occurrence has been specified for each level of improvement. Whilst acknowledging that these probabilities would normally range from 0 to 1, an arbitrary allocation was considered inappropriate in the context of this report. The standard probability of 0.2, which has been used in all tables, can obviously be varied at the reader's discretion.

Average check

An increase in average check is achieved by using "suggestive selling" techniques to increase the relative sales of the more highly priced menu items and to increase the sales of add-ons, liquor and wine. The effect of attainable increases in average check is shown in Table IV. By applying a probability of 0.2 to the five levels of improvement, the monthly increases in sales and net profit are \$1557 and \$483 respectively.

A computer-based system provides the only practical means of effectively monitoring server performance. Periodic readings of average check by server can be requested by the floor manager at any time during the meal period to allow corrective action to be taken as problems develop.

The most effective means of encouraging servers to improve on

existing standards is to conduct sales competitions on selected menu items. The ability of the computer to capture data at this level of detail, and to provide sales analysis by server, allows such competitions to be conducted on a continuing basis.

Seat Turnover

An increase in seat turnover is achieved by reducing the time that tables stand idle while guests are waiting to be seated, and by reducing server-dependent waiting time once they have been seated.

Table V presents the effect of a reasonable range of improvements in seat turnover. By applying a probability of 0.2 to each of the five levels of improvement, the monthly increases in sales and net profit would be \$1422 and \$441 respectively.

The reduction in idle table time would be achieved by allowing the hostess to allocate seats using the table status system described in Chapter 2. The reduction in server dependent waiting time would be achieved by allowing the floor manager to monitor server productivity by requesting periodic reading which report, by server, manhours per meal and sales per manhour. The ability to produce requisitions remotely and to settle guest checks more efficiently, also tends to reduce the customer's waiting time.

Sales Mix

An improvement in sales mix is achieved by using suggestive selling techniques to increase the relative sales of high-profit items. The effect of a 1% transfer in sales mix from entrees to add-ons and from beer to liquor is shown in Table VI. The \$0.06 gross

profit improvement per meal has been achieved without any increase in total sales. At a meal volume of 7550 per month, net profit would be increased by \$453. A computer-based system provides the ability to measure these improvements at the server level via on-demand reports and from the cumulative sales analysis used for monitoring competitive performance.

INCREASED BY AVERAGE CHECK

Percentage Increase in Average Check	Average Check	Monthly Increase in Sales*	Probability	Monthly Increase in Profit
1.0	13.75	100	1	0
1.5	14.25	150	2	150
2.0	14.75	200	3	300
2.5	15.25	250	4	450
3.0	15.75	300	5	600
3.5	16.25	350	6	750
4.0	16.75	400	7	900
4.5	17.25	450	8	1050
5.0	17.75	500	9	1200
5.5	18.25	550	10	1350
6.0	18.75	600	11	1500
6.5	19.25	650	12	1650
7.0	19.75	700	13	1800
7.5	20.25	750	14	1950
8.0	20.75	800	15	2100
8.5	21.25	850	16	2250
9.0	21.75	900	17	2400
9.5	22.25	950	18	2550
10.0	22.75	1000	19	2700
10.5	23.25	1050	20	2850
11.0	23.75	1100	21	3000
11.5	24.25	1150	22	3150
12.0	24.75	1200	23	3300
12.5	25.25	1250	24	3450
13.0	25.75	1300	25	3600
13.5	26.25	1350	26	3750
14.0	26.75	1400	27	3900
14.5	27.25	1450	28	4050
15.0	27.75	1500	29	4200
15.5	28.25	1550	30	4350
16.0	28.75	1600	31	4500
16.5	29.25	1650	32	4650
17.0	29.75	1700	33	4800
17.5	30.25	1750	34	4950
18.0	30.75	1800	35	5100
18.5	31.25	1850	36	5250
19.0	31.75	1900	37	5400
19.5	32.25	1950	38	5550
20.0	32.75	2000	39	5700
20.5	33.25	2050	40	5850
21.0	33.75	2100	41	6000
21.5	34.25	2150	42	6150
22.0	34.75	2200	43	6300
22.5	35.25	2250	44	6450
23.0	35.75	2300	45	6600
23.5	36.25	2350	46	6750
24.0	36.75	2400	47	6900
24.5	37.25	2450	48	7050
25.0	37.75	2500	49	7200
25.5	38.25	2550	50	7350
26.0	38.75	2600	51	7500
26.5	39.25	2650	52	7650
27.0	39.75	2700	53	7800
27.5	40.25	2750	54	7950
28.0	40.75	2800	55	8100
28.5	41.25	2850	56	8250
29.0	41.75	2900	57	8400
29.5	42.25	2950	58	8550
30.0	42.75	3000	59	8700
30.5	43.25	3050	60	8850
31.0	43.75	3100	61	9000
31.5	44.25	3150	62	9150
32.0	44.75	3200	63	9300
32.5	45.25	3250	64	9450
33.0	45.75	3300	65	9600
33.5	46.25	3350	66	9750
34.0	46.75	3400	67	9900
34.5	47.25	3450	68	10050
35.0	47.75	3500	69	10200
35.5	48.25	3550	70	10350
36.0	48.75	3600	71	10500
36.5	49.25	3650	72	10650
37.0	49.75	3700	73	10800
37.5	50.25	3750	74	10950
38.0	50.75	3800	75	11100
38.5	51.25	3850	76	11250
39.0	51.75	3900	77	11400
39.5	52.25	3950	78	11550
40.0	52.75	4000	79	11700
40.5	53.25	4050	80	11850
41.0	53.75	4100	81	12000
41.5	54.25	4150	82	12150
42.0	54.75	4200	83	12300
42.5	55.25	4250	84	12450
43.0	55.75	4300	85	12600
43.5	56.25	4350	86	12750
44.0	56.75	4400	87	12900
44.5	57.25	4450	88	13050
45.0	57.75	4500	89	13200
45.5	58.25	4550	90	13350
46.0	58.75	4600	91	13500
46.5	59.25	4650	92	13650
47.0	59.75	4700	93	13800
47.5	60.25	4750	94	13950
48.0	60.75	4800	95	14100
48.5	61.25	4850	96	14250
49.0	61.75	4900	97	14400
49.5	62.25	4950	98	14550
50.0	62.75	5000	99	14700
50.5	63.25	5050	100	14850

*Monthly Increase in Sales = Average Check x Monthly Increase in Sales

TABLE IV

IMPROVEMENT IN PROFIT

BASED ON

INCREASES IN AVERAGE CHECK

Percentage Increase in Average Check	Average Check	Monthly Increase In Sales *	Probability	Expected Value of Increase in Sales
	\$ 13.75			
0.5 %	13.82	\$ 519	.2	\$ 104
1.0	13.89	1038	.2	208
1.5	13.96	1557	.2	311
2.0	14.03	2076	.2	415
2.5	14.09	2595	.2	519
				<hr/> \$1557 p.m.
Improvement in net profit, assuming a contribution margin of 31%				<hr/> \$ 483 p.m.

*Sales per month = \$13.75 x 7550 meals = \$103,813

TABLE V

IMPROVEMENT IN PROFIT

BASED ON

INCREASED IN SEAT TURNOVER

Percentage Increase in Seat Turnover	Seat Turnover	Average Meals per Day	Meals per Day	Resultant Increase Sales		Prob-ability	Expected Value of Sales
				Daily	Monthly		
	1.720	248					
0.5 %	1.729	249	1	\$13.75	\$418	.2	\$ 84
1.0	1.737	250	2	27.50	836	.2	167
1.5	1.746	251	3	41.25	1255	.2	251
2.0	1.754	253	5	68.75	2091	.2	418
2.5	1.763	254	6	82.50	2509	.2	502
							<u>\$1422 pm</u>
Improvement in Net Profit							<u>\$ 441 pm</u>

Note: The above figures are based on the following assumptions:

- a) The number of dining room seats is 144
- b) The average sale per customer is \$13.75
- c) The contribution margin is 31% of sales

TABLE VI

<u>INCREASE IN PROFIT</u>						
<u>BASED ON</u>						
<u>IMPROVEMENT IN SALES MIX</u>						
	Sales			Gross Profit		
	Per Meal	Mix		as Percentage of Sales	Per Meal	Mix
<u>CASE 1</u>						
Entrees	\$ 8.14	59.2 %		51 %	\$ 4.15	55.7 %
Add-ons	1.01	7.3		59	0.60	8.0
Liquor	3.10	22.6		68	2.10	28.2
Wine	1.20	8.7		42	0.50	6.7
Beer	0.30	2.2		33	0.10	1.4
<hr/>						
Total	\$ 13.75	100.0		54	\$ 7.45	100.0
<hr/>						
<u>CASE 2</u>						
Entrees	8.00	58.2		51	4.08	54.3
Add-ons	1.14	8.3		59	0.67	8.9
Liquor	3.25	23.6		68	2.21	29.4
Wine	1.20	8.7		42	0.50	6.7
Beer	0.16	1.2		33	0.05	0.7
<hr/>						
Total	\$ 13.75	100.0		55	\$ 7.51	100.0

Case 2 shows the effect on total gross profit per meal of a 1% transfer in sales mix from Entrees to Add-ons and from Beer to Liquor. At a meal volume of 7550 per month, net profit would be increased by \$453.

Cost Reduction

Food Costs

The data handling capabilities of the computer provide the first practical opportunity to break down weekly food sales to the basic ingredient level for comparison against the actual ingredient usage as determined by the physical count. Having established the specific items at variance, the effort involved in identifying the underlying problems becomes a much simpler task.

Table VII presents the effect of a reasonable range of potential reductions in food cost which could be achieved as a direct result of this finer level of control. By applying a probability of 0.2 to each of the five levels of saving, the monthly saving in food sales would result in an increase in net profit of \$498.

Liquor Costs

Liquor sales can be broken down to basic ingredient and compared to actual usage, as in the food system. The potential savings, shown in Table VIII, amount to \$226 per month. The fully integrated liquor systems described in Chapter Two provide additional benefits, including cost savings, but due to a duopolistic situation in the market, the current unit prices of approximately \$45,000 per system preclude them from further consideration in this cost/benefit analysis.

Computer dispensing systems are designed to remove the opportunity for abuse of the control function (i.e., "front-end" control), whereas the systems proposed in this report are aimed at the earliest

possible detection of an actual deterioration in control (i.e., "back-end" control). The latter approach is preferred because more value is derived from the existing hardware investment and the only costs incurred relate to minor extensions to the food control software to provide for the inclusion of liquor.

SENSITIVITY TO COST

Assessment Interval in Days Cost	Monthly Savings to Food Costs	Probability	Expected Value of Savings
1.0	100	0.5	50
1.5	120	0.4	48
2.0	140	0.3	42
2.5	160	0.2	32
3.0	180	0.1	18

Summary of the Profile

The total cost of each of 10,000 x 100 units = \$10,000,000.

TABLE VII

IMPROVEMENT IN PROFIT
BASED ON
REDUCTIONS IN FOOD COST

Percentage Reduction in Food Cost	Monthly Savings in Food Cost*	Probability	Expected Value of Savings
0.5 %	\$ 166	.2	\$ 33
1.0	332	.2	66
1.5	498	.2	100
2.0	664	.2	133
2.5	831	.2	166

Increase in Net Profit \$498 p.m.

* Food Cost per month = \$4.40 x 7550 Meals = \$33,220

TABLE VIII

IMPROVEMENT IN PROFIT

BASED ON

REDUCTIONS IN LIQUOR COST

<u>Percentage Reduction in Liquor Cost</u>	<u>Monthly Saving in Liquor Cost*</u>	<u>Probability</u>	<u>Expected Value of Savings</u>
1.0 %	\$ 76	.2	\$ 15
2.0	151	.2	30
3.0	227	.2	45
4.0	302	.2	60
5.0	378	.2	76
Increase in Net Profit			<u>\$ 226 p.m.</u>

* Liquor cost per month = \$1.00 x 7550 meals = \$7550

Variable Labour Cost

The reduction of variable labour costs is accomplished by more accurately matching the scheduled availability of staff to projected customer volumes. The scheduling project described in Chapter Three addresses this problem, and the on-demand reports produced by the POS system assist in identifying volume variations as they occur. Further reductions in staff manhours are achieved by the system's ability to eliminate the cashier function, improve server efficiency and reduce hostess hours by the use of the table status system.

The potential monthly saving of \$245, shown in Table IX, is based on on-the-floor savings alone. The inclusion of the staff scheduling system would significantly increase the potential savings. As the cost of developing this system has not been included in the total comparative costs, however, the additional savings have not been included in the potential benefits.

TABLE IX

IMPROVEMENT IN PROFIT
BASED ON
REDUCTIONS IN VARIABLE LABOUR COST

Percentage Reduction in Variable Labour Cost	Monthly Savings in Variable Labour Cost*	Probability	Expected Value of Savings
1.0 %	\$ 82	.2	\$ 16
2.0	163	.2	33
3.0	245	.2	49
4.0	326	.2	65
5.0	408	.2	82

Increase in Net Profit \$ 245 p.m.

* Variable Labour Cost per month = $\$1.08 \times 7550 \text{ meals} = \8154

Clerical Labour Cost

The benefits of using a computer to process the general accounting applications can be grouped into benefits which reduce the clerical burden and those which provide more accurate, detailed and timely information for management action. As these benefits are difficult to quantify in a general context, the results of a recent study on the relief in clerical burden will be used to illustrate some of the potential savings in this area.

The first objective of the study was to specify every clerical task performed by management staff at the restaurant level. These activities were grouped by the daily, weekly and monthly frequency of performance. The time taken to complete each activity was sampled and recorded. The activity lists were then analyzed to determine which activities could be discontinued if a computer-based system was implemented. The activity times were totalled for both systems and the potential savings were extended by the applicable wage rate to determine the value of these savings on a monthly basis. The results, summarized in Table X, show a 35% reduction in clerical manhours, which represents a potential saving of \$713 per month.

TABLE X

IMPROVEMENT IN PROFIT
BASED ON
REDUCTION IN CLERICAL LABOUR COST

	Number of Activities			Estimated Hours Per Month			Estimated Savings Per Month		
	Manual System	Computer System	% Dec.	Manual System	Computer System	% Dec.	Office Manager	Food Manager	Service Manager
Daily	28	15	46	186	110	41	66	7.5	2.5
Weekly	41	15	63	80	36.5	54	18	13	12
Mid-Month Payroll	7	1	86	5	0.3	94	5	-	-
Prior to Month-End	12	2	83	9	1.2	83	7.5	-	-
Month-End Activities	68	25	63	36	10	72	18.5	4	4
Computing Operating Overhead				-	47	-	(47)		
Total Monthly Activities	156	58	63	316	205	35	68	24.5	18.5
Hourly Wage Rate							5.85	7.10	7.60
Potential Monthly Savings							\$398	\$174	\$141
Increase in Net Profit								\$713	

CHAPTER SEVEN

CONCLUSION

The study has shown that the present approach to computer application in the restaurant industry has been influenced by the earlier experiences in the fast food and institutional sectors of the food service industry. Basic electronic cash register equipment is being replaced by integrated point-of-sale systems. The processing capabilities of these systems are being enhanced to permit a more effective use of seating capacity and to include the automatic dispensing of alcoholic beverages. The standard accounting applications, such as accounts payable and payroll, are being automated in the chain operations, where the higher processing volumes can more readily justify the initial costs.

The experience of the contract feeding organizations in automating their menu planning, purchasing and inventory control functions has encouraged the chain operations to extend their implementation to the management accounting applications. The ability to capture labour data at the point-of-sale has provided a practical means of establishing accurate productivity records and a more refined approach to labour scheduling.

The need to compare the performance of many similar units within a chain operation has promoted the use of ratio analysis as a convenient means of reducing the number of variables for comparative

evaluation. The speed of the computer is expanding this technique into a more comprehensive analysis which tests for the sensitivity of all financial variables to the incremental change in the value of a single variable.

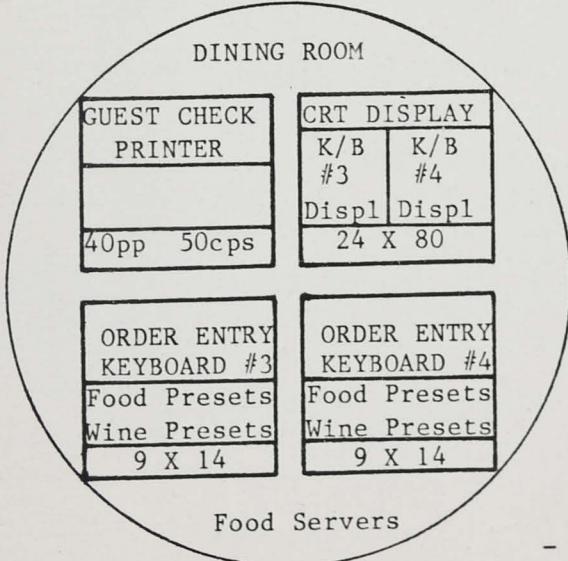
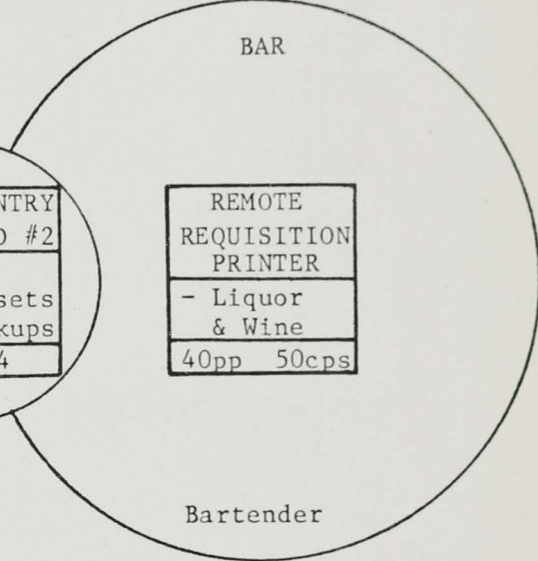
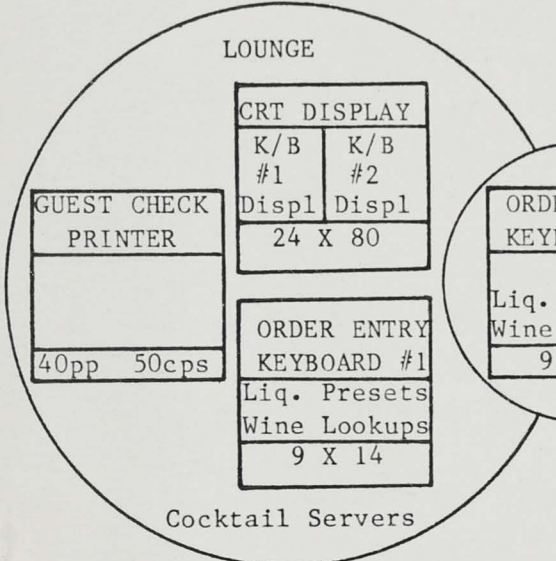
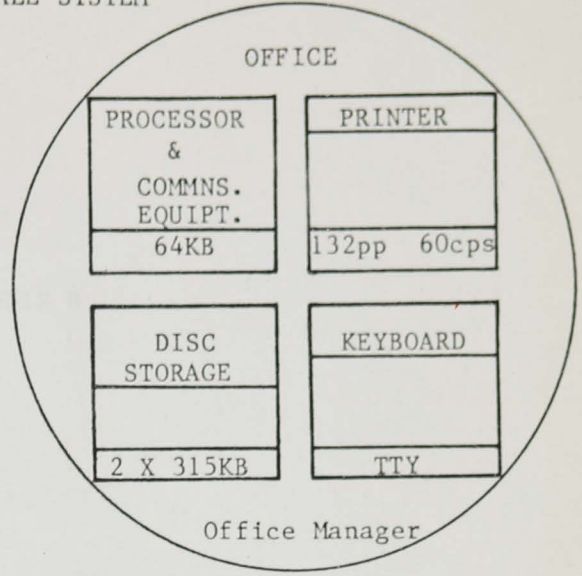
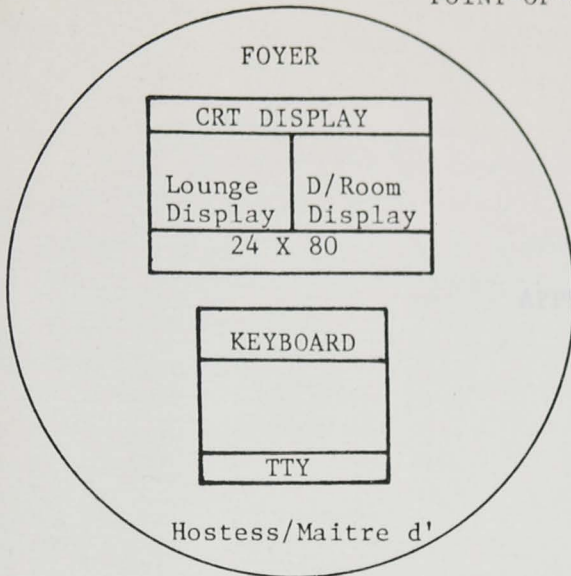
Recent developments in microprocessor technology are about to make the fully-computerized restaurant a reality. The previous chapter showed that net potential benefits of approximately \$300 per month for single-unit operations, and \$2100 per unit per month for chain operations, are now achievable with an integrated system.

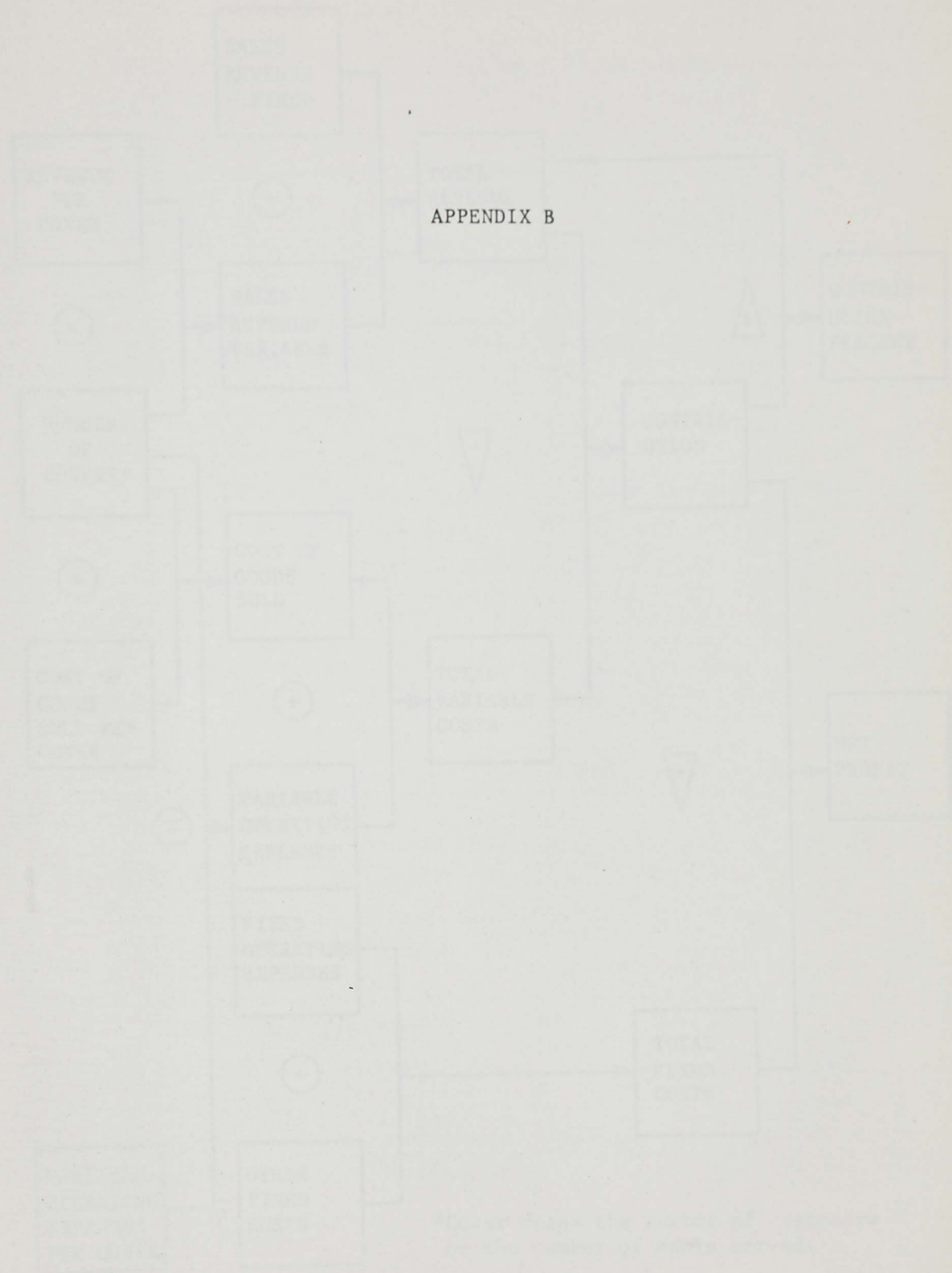
These benefits should increase over the next two to three years as both the restaurant industry and the computer industry work towards achieving a "packaged" approach to the total application, and as competitive forces are brought to bear on this relatively virgin market.

APPENDIX A



SAMPLE LAYOUT OF AN INTEGRATED
POINT-OF-SALE SYSTEM

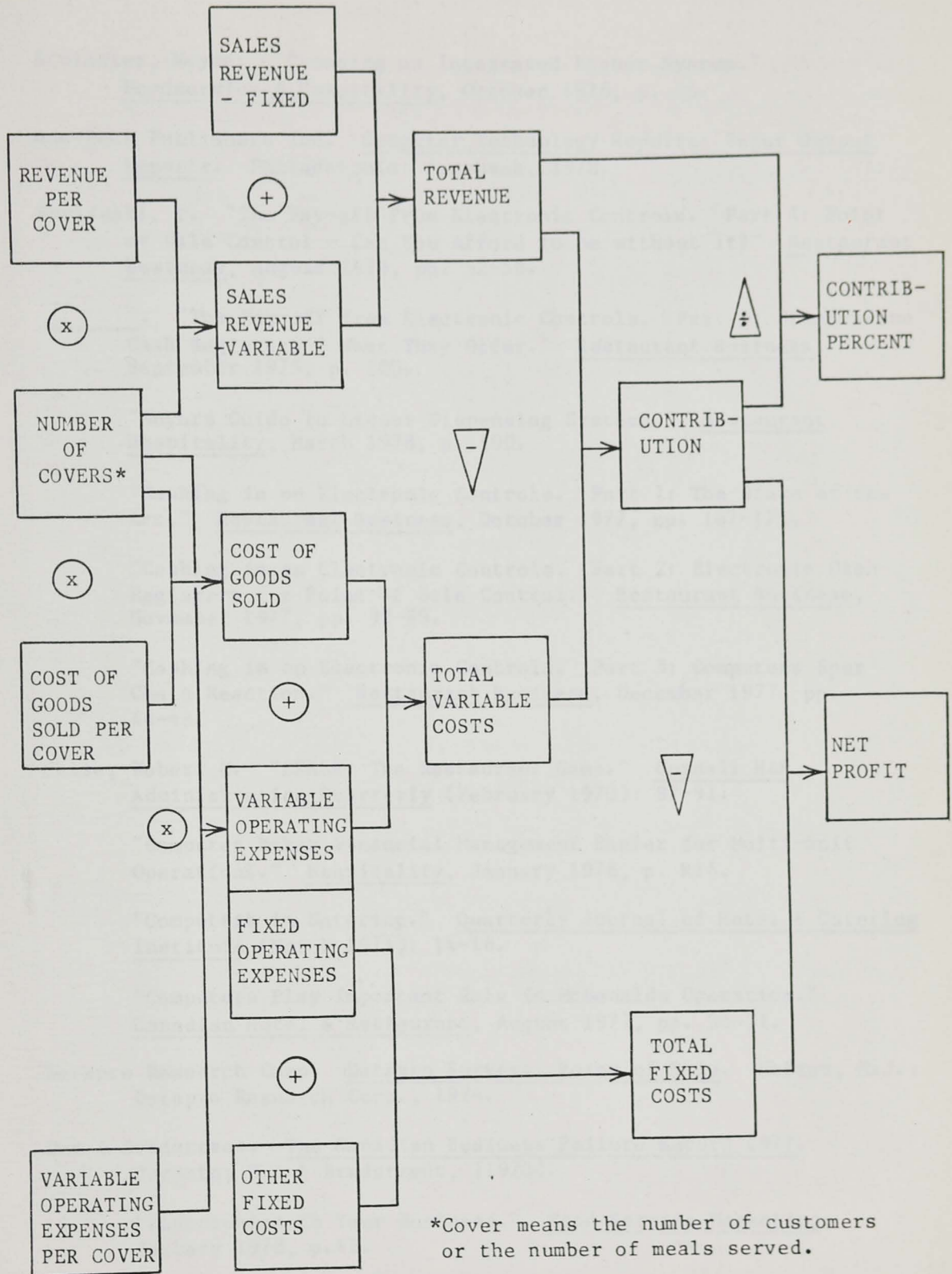




APPENDIX B

Flowchart shows the process of determining the number of units to produce.

RESTAURANT COST-VOLUME-PROFIT MODEL



BIBLIOGRAPHY

- Arblaster, Wayne. "Choosing an Integrated Liquor System." Foodservice & Hospitality, October 1976, p. 76.
- Auerbach Publishers Inc. Computer Technology Reports: Input Output Reports. Philadelphia: Auerbach, 1978.
- Berlinski, P. "The Pay-off from Electronic Controls. Part 1: Point of Sale Control - Can You Afford to be without it?" Restaurant Business, August 1975, pp. 52-58.
- _____. "The Pay-off from Electronic Controls. Part 2: Stand-alone Cash Registers - What They Offer." Restaurant Business, September 1975, p. 100.
- "Buyers Guide to Liquor Dispensing Systems." Restaurant Hospitality, March 1978, p. 100.
- "Cashing in on Electronic Controls. Part 1: The State of the Art." Restaurant Business, October 1977, pp. 167-171.
- "Cashing in on Electronic Controls. Part 2: Electronic Cash Registers for Point of Sale Control." Restaurant Business, November 1977, pp. 92-99.
- "Cashing in on Electronic Controls. Part 3: Computers Spur Chain Reaction." Restaurant Business, December 1977, pp. 44-48.
- Chase, Robert M. "CRASE: The Restaurant Game." Cornell H&R Administration Quarterly (February 1970): 87-91.
- "Computer Makes Financial Management Easier for Multi-unit Operations." Hospitality, January 1976, p. R16.
- "Computers in Catering." Quarterly Journal of Hotel & Catering Institute (March 1971): 14-16.
- "Computers Play Important Role in McDonalds Operation." Canadian Hotel & Restaurant, August 1977, pp. 30-31.
- Datapro Research Corp. Datapro Surveys: Point of Sale. Delran, N.J.: Datapro Research Corp., 1974.
- Dun & Bradstreet. The Canadian Business Failure Record 1977. Toronto: Dun & Bradstreet, [1978].
- "Electronics in Your Business." Food Service Marketing, January 1978, p.12.

- Eyster, James J. "Insuring Your Profit Margin: Restaurant Cost-Volume-Profit Analysis." Cornell H&R Administration Quarterly (November 1974): 25.
- Fay, Clifford T. Jr.; Rhoads, Richard C.; and Rosenblatt, Robert L. Managerial Accounting for the Hospitality Services Industries. Dubuque, Iowa: W.C. Brown, 1971.
- Fearn, David A. Management Systems for the Hotel, Catering and Allied Industries. London: Business Book, 1969.
- Freshwater, John F.; and Bragg, Errol R. "Improving Food Service Productivity." Cornell H&R Administration Quarterly (February 1975): 17.
- Hannay, Norman J. "The ABC's of Automatic Beverage Dispensing: A Survey of Available Equipment." Cornell Hotel and Restaurant Administration Quarterly (November 1977): 39-45.
- Keiser, James R., and Kallio, Elmer. Controlling & Analyzing Costs in Food Service Operations. New York: John Wiley & Sons, 1974.
- Kennedy, Kathleen. "Tower Restaurant Goes On-Line." Canadian Datasystems, July 1976, p. 16.
- Kostuch, Mitch, ed. Canada's Hospitality Business. Toronto: McLean Hunter, 1977.
- Kotschevar, Lendal H. "Scientific Method: Your Key to Profession Survival." Club Management, April 1973, p. 64.
- Lattin, Thomas W. "Computers and the Hospitality Industry." Cornell H&R Administration Quarterly (February 1970): 84-86.
- Laventhol & Horwath. Uniform System of Accounts for Restaurants. Chicago: National Restaurant Assn., 1972.
- Lev, Baruch. Financial Statement Analysis: A New Approach. Englewood Cliffs, N.J.: Prentice Hall, 1974.
- Levinson, Charles. Food and Beverage Operation: Cost Control and Systems Management. Englewood Cliffs, N.J.: Prentice Hall, 1976.
- "Minicomputer Helps Manager Find Hidden Operating Costs." Canadian Hotel & Restaurant, June 1978, p. 32.
- "Modern Cash Registers - Complete Food System Controls." Food Service and Hospitality, July/August 1977, pp. 51-52.
- Moore, Richard G.; and Selling, Thomas I. "An Economic Analysis of Hotel Computing Systems." Cornell Hotel and Restaurant Administration Quarterly (February 1977): 4-10.

Nielsen, Timothy K. "Management Information Systems: Providing Relevant Data for the Right Decision." Fast Food, March 1971, pp. 78-85.

"On-Line Help for the Independent. Stand Alone Electronic Cash Control." Drive-in Fast Service, October 1976, p. 24.

Parks, Elizabeth. "Industry Arms with Technology for Battle vs. Rising Costs." Nation's Restaurant News, 21 August 1978, p. 1.

Powers, Thomas F. "Food Service in 1985." Cornell H&R Administration Quarterly (May 1976): 40-54.

Quakenbush, C.W. "Moving the Computer into the Kitchen." Restaurant Business, September 1976, p. 60.

Singh Rekhi, Ragvinder. "Computerized Food and Beverage Control: A Concept." Independent Study Project, Cornell University, 1974.