

Journal of Hospitality Financial Management

The Professional Refereed Journal of the Association of Hospitality Financial Management Educators

Volume 24 | Issue 2

Article 5

11-14-2016

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Recommended Citation

Raab, Carola and Zemke, Dina Marie (2016) "ACTIVITY-BASED COSTING IN THE RESTAURANT INDUSTRY: WHAT'S PAST IS PROLOGUE," *Journal of Hospitality Financial Management*: Vol. 24 : Iss. 2 , Article 5.

DOI: 10.1080/10913211.2016.1239488

Available at: <https://scholarworks.umass.edu/jhfm/vol24/iss2/5>

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ACTIVITY-BASED COSTING IN THE RESTAURANT INDUSTRY: WHAT'S PAST IS PROLOGUE

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ABSTRACT. Restaurant managers often do not have a comprehensive understanding of all of the costs involved in operating a successful restaurant, leading to inaccurate, and potentially unprofitable, menu item pricing. One trend in cost analysis is to explore techniques used in other industries, including activity-based costing. A body of work exploring the application of activity-based costing in the foodservice industry has gradually evolved. A review of previous research on activity-based costing in various restaurant segments validates it as a consequential approach that is capable of reducing waste, preserving employment, and producing maintainable profitability in the restaurant industry.

INTRODUCTION

The restaurant industry is a challenging business. Today's restaurant customers are increasingly sophisticated regarding food and service quality. Restaurant managers face numerous difficulties in achieving ongoing profitability. Profit margins are usually relatively low, leaving no margin of error for operator mistakes (LeBruto, Ashley, & Quian, 1997; Taylor & Brown, 2007). Restaurant managers are also often challenged by marketing and finance tasks (Raab, Mayer, Shoemaker, & Ng, 2009). Most restaurants' marketing activities consist of promotions to increase sales volume, such as discounting menu prices, often resulting in increased volume but decreased profitability. Overreliance on discounting and other promotions gradually erodes the restaurant's financial position, leading to the restaurant's going out of business. A primary driver of this downward spiral is that restaurant managers do not have a comprehensive understanding of all costs involved in sustaining a successful restaurant (Raab & Mayer, 2007).

Identifying variable costs, such as food cost, is fairly intuitive for novice restaurant owners,

who use them to set menu item prices. However, they often overlook the effect of overhead costs, even failing to account for labor costs associated with food and beverage preparation and service. This is a primary contributor to restaurant failure. More experienced food and beverage operators account for overhead costs when setting menu prices and performing breakeven analysis. A current trend in cost analysis is to explore techniques from other industries, such as manufacturing, to improve the accuracy of cost identification. One such technique is activity-based costing (ABC).

A body of work exploring the application of ABC in the hospitality industry has gradually evolved. The technique has been demonstrated in a wide variety of foodservice and hotel applications (Pavlatos, 2009). However, it is appropriate at this point in ABC's evolution to look at past restaurant ABC research, its effect on traditional ABC theories, and its potential future effect on the restaurant industry. The studies discussed here illustrate how ABC can be applied in different restaurant segments and how this application complements traditional methods in manufacturing.

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LITERATURE REVIEW

Overview of Cost Allocation and Pricing in the Restaurant Industry

The restaurant industry commonly uses the contribution margin approach to establish menu prices. This process sets a menu item's selling price on the basis of a desired food cost percentage. The expectation is that the difference between a menu item's price and food cost will cover overhead costs (such as labor costs, marketing costs, utility costs), along with taxes and profits (Raab & Mayer, 2004). Once selling prices are set, operators only change prices if variable costs (specifically, food cost and beverage cost) change, but they rarely actually analyze their menu items for profitability.

Managers often find it difficult to identify the reason why their restaurants lose money. If the selling price is based solely on variable costs, the menu prices might not result in profitability, because management has an imprecise knowledge of total menu item costs (variable cost plus overhead costs). A menu item price may be low, with a low food cost, but could be labor-intensive to prepare, thus incurring high overhead costs that must be integrated into the selling price.

Previous research established that, in highly competitive markets, prices cannot be set solely on the basis of variable costs. Researchers applied ABC as an alternative approach

(Annaraud, Raab, & Schrock, 2008; Ben Hadj Salem-Mhamdia & Bejar Ghadhab, 2012; Raab, Hertzman, Mayer, & Bell, 2006; Raab, Mayer, Ramdeen, & Ng, 2005; Raab, Mayer, & Shoemaker, 2009; Raab, Shoemaker, & Mayer, 2007). For an overview of past research, please refer to Table 1.

What Is ABC?

ABC is a theoretical approach that provides manufacturing and service firms with a better comprehension of their costs, greatly enhancing traditional contribution margin approaches (Cooper & Kaplan, 1988a; Kaplan, 2000; Rotch, 2000). ABC's major advantage over other costing methods is its ability to trace the most expensive overhead costs to individual products and not to merely allocate them.

One condition that makes companies good candidates for applying ABC is a diversity of resource consumption, where product and resource consumption are not correlated with traditional cost allocation methods. This characteristic is certainly present in the foodservice industry. For example, each menu item utilizes different types and amounts of food and preparation time.

Advantages of Applying ABC to the Restaurant Industry

Today, overhead expenses represent about half of all restaurant costs. Labor costs,

TABLE 1. Summary of Activity-Based Costing in the Hospitality Literature

Author(s)	Year	ABC application and setting
Raab and Mayer	2004	Explored the use of ABC in the U.S. restaurant industry
Raab, Mayer, Ramdeen, and Ng	2005	Applied ABC in a Hong Kong restaurant
Raab, Shoemaker, and Mayer	2007	Demonstrated the application of ABC in a fine dining restaurant
Raab, Hertzman, Mayer, and Bell	2006	Incorporated ABC into a menu engineering analysis
Raab and Mayer	2007	Applied ABC menu engineering to a buffet restaurant
Annaraud, Raab, and Schrock	2008	Applied ABC in a quick-service restaurant
Vaughn, Raab, and Nelson	2010	Application of ABC to a support kitchen in a casino
Raab, Mayer, Shoemaker, and Ng	2009	Activity-based pricing applied to a Hong Kong restaurant
Raab, Mayer, and Shoemaker	2009	Exploratory study that used an ABC/CM profit factor comparison approach
Vaughn, Raab, and Nelson	2010	ABC applied to a support kitchen in a casino
Ben Hadj Salem-Mhamdia and Bejar Ghadhab	2012	Combined value management and ABC in a Tunisian restaurant

Note. ABC = activity-based costing; CM = contribution margin.

considered a part of the restaurant's overhead, usually make up the largest proportion of total cost. However, overhead costs are rarely considered when product prices are established, which are usually calculated strictly as a function of cost of goods sold, plus a percentage for markup (LeBruto et al., 1997; Taylor & Brown, 2007).

ABC traces overhead costs to individual menu items, enhancing managerial decision making. Given that overhead costs represent a large share of total costs, assigning this cost to individual menu items is beneficial, especially for marketing tasks such menu pricing and promotional activities, to ensure profitability.

ABC also assists in pinpointing profitable market segments by identifying true menu item costs. At present, restaurant managers often do not understand the differences in profitability between each customer segment because they do not know the actual profit margins of their menu items. ABC helps management determine which menu items are truly profitable and also helps identify who the most profitable customers are by tracing these products to the customer. Thus, marketing dollars can be spent more efficiently by targeting the most profitable customer segments.

Another advantage of the ABC method is its inherent emphasis on activities, which can improve the service production and delivery process. A deep understanding of production activities allows better control of labor costs without decreasing the level of service provided to the customer. This assists in reducing organizational waste and service delays, improving customer and employee satisfaction, operational efficiency, and cooperation between back-of-the-house (BOH) and front-of-the-house (FOH) operations. A more efficient, process-oriented organization should achieve increased labor productivity, thereby decreasing labor costs directly and indirectly.

The remainder of this article reviews ABC's theoretical basis and its basic principles. The article then traces the evolution of ABC through the application to different restaurant segments.

ABC Theoretical Framework

In the past, economists have embraced the idea that only marginal (variable) costs should be considered to set prices and fixed costs should be ignored as sunk costs, which are then arbitrarily allocated. However, all costs are ultimately variable (Cooper, 2000). ABC assumes that overhead is not consumed in proportion to the number of units produced (Cooper and Kaplan, 1988a; Kaplan, 2000; Cooper, 2000; Horngren, Datar, & Foster, 2007). Activities are traced to the actual product that triggered the activity, permitting assignment of costs to the product itself (Cooper & Kaplan, 1991, 1992; Horngren et al., 2007; McNair, 2007).

ABC has been used extensively in manufacturing to track direct overhead costs to individual production items. As product lines expand, overhead commitments increase to support product diversity (Cooper & Kaplan, 1988a; Cooper & Kaplan 1991; Horngren et al., 2007). Cooper and Kaplan (1988a) established ABC to assist manufacturing management to understand indirect costs on a per unit basis (O'Guin, 1991), and Cooper and Kaplan (1988a) demonstrated that ABC augments contribution margin analysis. The most recognized benefit of ABC is the insight into managing the activities that lead to undistributed costs (Cooper, 2000). Consequently, ABC leads to a very good estimate of undistributed costs on a per-unit basis. Managers can estimate total costs per unit in a way that is not possible with contribution margin-based cost analysis.

The Evolution of ABC in the Restaurant Industry

Characteristics that make an operation a candidate for ABC include "diversity of resource consumption, products and resource consumption not correlated with traditional, volume-based allocation measures" (Rotch, 2000, p. 68). These characteristics describe the foodservice industry, which Kock (1995) recommended as fertile ground for combining ABC with more traditional restaurant-based approaches. Thus, researchers applied ABC

to several restaurant segments, including fine dining, buffet, quick service, and casino support kitchens (Annaraud et al., 2008; Raab & Mayer, 2004; Raab et al., 2005; Raab et al., 2006; Raab et al., 2007; Raab & Mayer, 2007; Vaughn et al., 2010). A step-by-step guide to applying ABC is provided in the Appendix.

State of the Industry. Raab and Mayer (2004) surveyed comptrollers and managers of the top 100 restaurant firms in the United States to explore the potential for applying ABC in restaurants. They inquired about the respondents' knowledge of ABC theory and the use of ABC in their restaurants. The results showed that ABC was not applied in the top 100 U.S. restaurant companies. In addition, respondents stated that they were aware of the concept but did not know how to apply it and suggested a need to enhance traditional contribution margin approaches.

Buffet Restaurants. Raab and colleagues (2005) applied ABC to a buffet restaurant in Hong Kong. The researchers traced labor and direct operating costs to the buffet entrees and allocated the rest of the costs to a facility-sustaining cost pool (see Figure 1).

Traditional ABC methods had to be altered to calculate ABC costs for the buffet. First, a bill of activity for each customer had to be constructed because FOH activities were homogeneous for each customer. True resource consumption was only found in the BOH, which was then reflected in an additional bill of activity per buffet entree containing only the food costs and BOH batch-level cost for the

item. The results revealed that the restaurant was losing HK\$33 on each buffet dinner sold.

A menu engineering approach for buffets was then developed, applied first to variable costs and then to the established ABC cost. Raab and Mayer (2007) discussed this approach in detail, examining whether the combined method provides new insights about true menu profitability. The combination resulted in a new approach that allows for accurate management decisions regarding what items to include in the buffet menu, which is an especially useful tool for unprofitable operations. The authors observed that, contrary to restaurants in other parts of the world, labor costs in Hong Kong were relatively low, while facility-sustaining costs such as rents were relatively high, diminishing the effectiveness of the ABC analysis.

Fine Dining Restaurants. Raab and colleagues (2007) then tested Raab and colleagues' (2005) model in a fine dining restaurant in the United States. Although the study also traced labor and direct operating costs to dinner entrees, the nature of this restaurant segment allows for one bill of activity per menu item, which is quite different from the aforementioned buffet restaurant.

Other characteristics also differed from the Hong Kong example. First, labor costs tend to be higher and occupancy costs are lower in the United States than in Hong Kong. Therefore, tracing labor to individual products is more productive than in the Hong Kong. Facility-sustaining costs are also generally lower in the

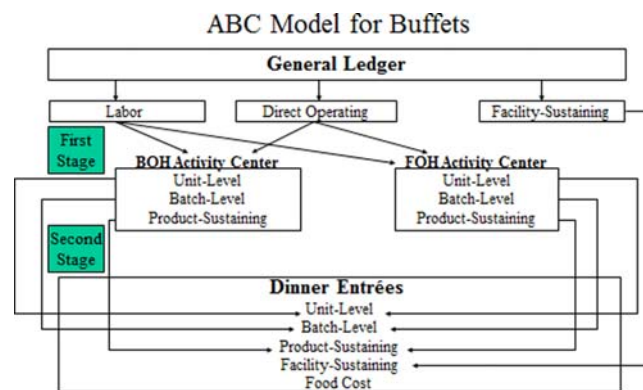


FIGURE 1. ABC model for buffets (adapted from Cooper & Kaplan, 1988a).

United States, which should allow for a low allocation value (total facility-sustaining costs/number of units sold). However, in this case, the restaurant sold a low volume of entrees, leading to a relatively high allocation value. This distorted the ABC calculation, although it did reflect the business situation accurately. In addition, the researchers observed that, for both restaurants, it was not efficient to trace direct operating costs; they thus concluded that the model should be altered to include these costs in the facility-sustaining cost pool (see Figure 2). Ultimately, the results confirmed that ABC feasibility in establishing overall menu profitability.

ABC Plus Menu Engineering. The contribution margin-based menu engineering model for buffets and fine dining was then transformed into an ABC-based menu engineering model, by replacing food cost with total cost—activity-based cost (Raab, Hertzman, Mayer, & Bell, 2006; Raab & Mayer, 2007). Both approaches were applied, and the results were compared. The traditional menu engineering analysis showed a positive overall contribution margin for the menu, but the ABC approach revealed a negative overall operating profit. Understanding the true costs would not have been possible using traditional contribution margin-based menu engineering methods alone. The effort required to apply ABC in a restaurant is worthwhile to comprehend menu profitability.

Quick Service Restaurants. Annaraud and colleagues (2008) adapted the model displayed in Figure 2, for a quick-service

restaurant in Southeastern United States. The revised model included a utility cost pool, and utilities (e.g., electricity, water, and natural gas) were successfully traced to individual menu items for the first time. A single activity center was used (see Figure 3), given that FOH and BOH activities are indistinguishable in this restaurant segment, which provides little or no FOH service. A comparison of contribution margin results and ABC outcomes confirmed issues central to traditional manufacturing ABC literature—that traditional methods yield misguided cost information and product prices. Here, only two menu items showed positive operating profits. This study confirms that ABC is a superior method for establishing overall menu profitability and that management decisions will improve dramatically if shown differing results from a contribution margin analysis and an ABC approach.

Price Sensitivity. Raab, Mayer, Shoemaker, and Ng (2009) incorporated ABC in a price sensitivity analysis for a buffet restaurant. Combining the pricing and costing activities resulted in an activity-based pricing model for restaurants. The integrated approach proved to be superior by incorporating the customers' price perceptions and the total cost per buffet. This study demonstrated that either method by itself would have not been sufficient to understand the restaurant's total profitability picture; ABC's effectiveness is magnified when combined with pricing data.

Profit Factor Analysis. Raab, Mayer, and Shoemaker (2009) tested for differences

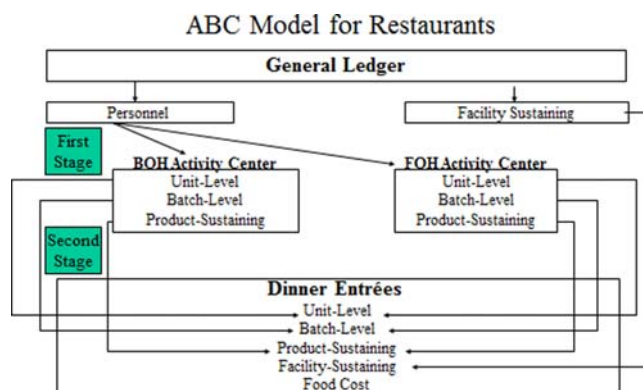


FIGURE 2. ABC model for restaurants (adapted from Raab, Mayer, Ramdeen, & Ng, 2005).

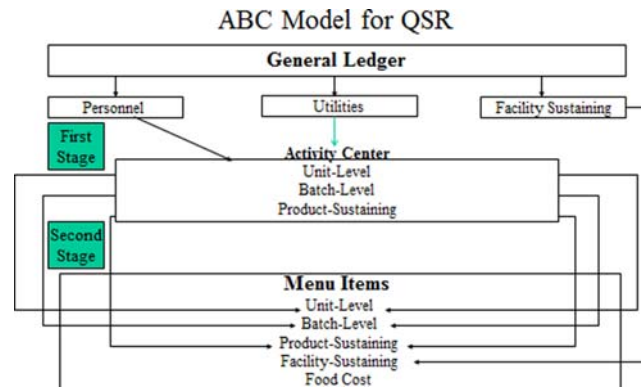


FIGURE 3. ABC model for quick-service restaurants (adapted from Cooper & Kaplan, 1988; Raab, Mayer, Ramdeen, & Ng, 2005).

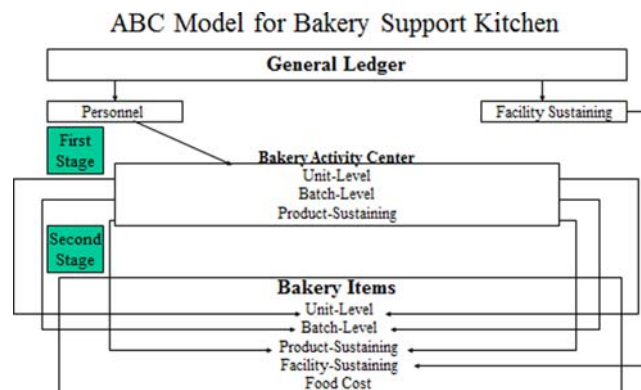


FIGURE 4. ABC model for Baker support kitchen (adapted from Annaraud, Raab, & Schrock, 2008).

between contribution margin and ABC methods, using the model displayed in Figure 4, which incorporated a profit factor analysis, introducing another dimension of relative profitability to the ABC research. The study tested four hypotheses and found no significant correlation between the contribution margin and ABC methods, which suggests that they are very different methods. These findings support previous ABC research, indicating that ABC is a superior method in general, simply because it includes all costs.

Support Kitchens. Vaughn, Raab, and Nelson (2010) tested the ABC approach in a bakery support kitchen in a casino-resort's hotel; the support kitchen provides baked goods to all of the foodservice outlets in the property and does not have any FOH operations. ABC methods were again compared with traditional allocation approaches, applying Raab and Mayer's (2007) model to

test whether traditional allocation methods that are based on food costs yield incorrect results and should be eliminated. The results showed that ABC methods can be applied successfully in support kitchens, with immense impact. Without the benefit of the ABC analysis, restaurant managers for individual food and beverage outlets received an unfair share of the overhead and did not have appropriate cost information for bread products. Major changes were incorporated at the property following the study's recommendations, where items that were previously outsourced were now produced in-house, and some items that were produced before were now outsourced.

Value Management. Ben Hadj Salem-Mhamdia and Bejar Ghadhab (2012) extended ABC research by testing whether an ABC approach combined with value management can improve menu profitability. The study used the ABC/value management method in

a Tunisian restaurant to obtain the best value, using customer satisfaction and total product cost. The study specifically broadens Raab, Mayer, Shoemaker, and Ng's (2009) research, which merged ABC and price sensitivity analysis. Data were collected using direct observations of restaurant activities to calculate ABC and menu item earnings, and a questionnaire was administered to determine customer satisfaction.

The study showed that the ABC/value management approach yields different results than traditional menu analysis. Ben Hadj Salem-Mhamdia and Bejar Ghadhab calculated earnings per menu item and, at the same time, evaluated customer satisfaction for each item. The authors concluded that the study confirmed the results from previous ABC research, specifically stating that ABC is a feasible way of product costing.

IMPLICATIONS

ABC has evolved over time to create a variety of tools to help both foodservice managers and hospitality scholars gain a greater understanding of the full range of costs associated with providing a restaurant's product.

Theoretical Implications

Traditional ABC systems work effectively in advanced manufacturing environments, which shifted from labor-intensive to capital-intensive conditions, and make traditional methods of overhead allocations on the basis of direct labor hours obsolete (Cooper 2000; Cooper & Kaplan, 1991, 1992). When ABC is applied to a manufacturing setting, the greatest opportunity for productivity improvement can be achieved by concentrating on batch and product-sustaining activities (Cooper & Kaplan, 1991).

In contrast, the best chance of improving restaurant productivity is through enhancing all levels of activities, because manual labor is still a crucial part of restaurant production and service processes. Technological advances that dramatically impacted the manufacturing environment have not yet happened to the same extent in restaurants. Therefore, the

restaurant industry can profit from ABC theory by focusing on unit-level activities with the same intensity that traditional theory suggests for batch and product-sustaining activities. The cost structure of restaurants also differs from other industries by classifying direct labor as a part of overhead costs, while direct labor in the manufacturing industry is classified as a variable cost that can be assigned to individual products without the application of ABC. Restaurants can benefit greatly from the application of ABC by tracing labor costs, along with food and beverage costs, to individual products.

Next, Cooper's (1989) two-stage ABC process is applicable to restaurants, given some modifications. O'Guin (1991) suggested that ABC systems designed for the manufacturing industry should be as simple as possible. The studies discussed in this article observed that ABC systems for restaurants must be simple to make them easy for restaurant managers to understand and feasible to implement. For example, the model that proved to be most effective in restaurants is one with only two cost pools, labor and facility-sustaining (see Figure 3). In addition, traditional ABC theory (Cooper & Kaplan, 1991; O'Guin, 1991; Turney, 1991) suggests establishing numerous activity centers for complex manufacturing structures, while in restaurants, activity centers can simply be identified as FOH or BOH.

Traditional ABC theorists suggest that a process value analysis should be performed to identify the value of all activities. However, processes are difficult to standardize in the restaurant industry because of the industry's labor-intensive nature. In general, a large percentage of activities in the restaurant industry are non-value-added, which may explain why restaurants traditionally have high labor costs and low profit margins. Even though most non-value-added activities cannot be eliminated or automated in restaurants, as recommended by traditional ABC theory (Cooper & Kaplan, 1991), a process value analysis is crucial to identify how these activities can be conducted more efficiently or outsourced.

Next, traditional ABC theory suggests that overhead costs should be traced to individual

products as often as possible to gain precise knowledge about product costs (Cooper & Kaplan, 1991). In restaurants, it is most efficient to trace labor costs to menu items and to allocate the rest of the overhead cost. This is particularly true for North American restaurants, where labor costs are, in general, relatively high. The ABC model shown in Figure 2 works best in North America when specifying only two cost pools. In Asia, labor costs are lower and occupancy costs, such as rent, are higher. Occupancy costs are facility-sustaining costs that require allocation, making the system less efficient. Restaurants with low business activity (i.e., low production volume) have high allocation values. Management should evaluate high allocation values and conduct what-if analyses to estimate allocation values at different business levels and take action to increase business. However, facility-sustaining costs were low in most locations tested in the previous literature, and therefore could be allocated accurately. The phenomenon of fluctuating allocation values also differs from traditional theory.

Bills of activities suggested by traditional ABC theory (Cooper & Kaplan, 1988b) must be modified, depending on the restaurant segment's characteristics. For example, two bills of activities were needed for a buffet restaurant—one per customer and one containing only BOH batch-level activities and food costs for the buffet item (Raab et al., 2005).

Next, some of the studies reveal a potentiating effect that occurs when combining ABC and other theories or methods, such as combining ABC with price sensitivity, menu engineering, or value management. For example, ABC in restaurants provides information about non-value added activities and promotes waste elimination. Moreover, ABC delivered total cost information that promotes low-cost and high-quality product designs and information about desired target markets. Vaughn and colleagues (2010) found that ABC aids in accurate make-or-buy decisions in a support kitchen. Most important, the research shows that ABC in restaurants facilitates proper pricing strategies and profitability information,

crucial for restaurants' survivals in a hypercompetitive market.

Managerial Implications

ABC techniques yield several implementation challenges for restaurant managers, but also provide enormous opportunities for robust menu costing and overall profitability. First, separating overhead costs into homogenous cost pools and their assignment to activity centers reveal exactly where major overhead costs occur, a fact often not clearly observed by most managers. Managers can then use process value analysis to improve non-value-added activities, which should assist in reducing labor costs. Processes that do not add value need to be eliminated or reengineered.

Managers can further use ABC/menu engineering analysis to reevaluate which menu items to retain or improve and which items to reprice, according to market conditions and customer demand. Managers should concentrate on market segments that purchase the most profitable items; all unprofitable menu items should be eliminated, except for items that are priced low for promotional purposes. Most of the ABC analyses in the previous research revealed some menu items that were not profitable; every time a restaurant sells these items, it loses money. Management needs to examine these items to increase prices, or rework the recipe to reduce the ABC basis.

THE FUTURE OF ABC

The research on ABC in various restaurant segments validates ABC as an innovative method to assist restaurants in achieving profitability. Even though ABC in restaurants has been the topic of 11 studies discussed in this article, it is unknown how many restaurants actually apply ABC.

We have discussed ABC with restaurant managers, who say, "ABC can't be done, because we've never done it before and we do not know how." These managers say that they are aware of the concept of ABC but do not implement it and mostly still use

contribution margin approaches to costing and pricing (J. Yedlin and D. Woods, personal interviews, January 6, 2016). Others mention that they partially apply ABC by assigning direct labor costs to individual menu items (Raab & Mayer, 2004).

A review of the recent practices of the top 100 revenue producing restaurant firms in the United States revealed that some top-producing restaurant chains, such as McDonald's and Pizza Hut, do use ABC to capture true costs and to enhance the value chain of their operations (Sadderman, 2015; "SCA Case Study McDonalds," 2013). Given that ABC is particularly useful in determining unit labor costs, more restaurant firms can be expected to follow suit. Once managers and employees comprehend the true benefits of an ABC system, they can manage the restaurant and execute tasks in a profitable manner while delivering value to the customer, improving the business' sustainability.

There is also a clear need to combine ABC in with other management systems. For example, Noone and Griffin (1997) suggested that combining revenue and cost data can yield crucial information about the customer and product mixes and can enhance profit maximization in general. Huefner and Largay (2008) emphasized the importance of costs in strategic pricing decisions, and Burgess and Bryant (2001) proposed that costs must be identified to support revenue management decisions. Even though revenue management focuses on pricing, profitability, and therefore costs, must be considered. Cost cutting is often applied to enhance profitability in restaurants. However, cost cutting has its limits, and revenue growth is necessary to achieve profitability (Huefner & Largay, 2008; Mass, 2005). Even though ABC is not a cost-cutting method, it provides an excellent estimate of overhead costs for individual menu items and is a suitable complement to revenue management methods.

Many restaurants have applied revenue management-type practices (Kimes, Chase, Choi, Lee, & Ngonzi, 1998), but these approaches are at best tactical and consist

mostly of some sort of discounting approach. Restaurants generally have low variable costs and relatively high fixed costs, making them candidates for revenue management methods. Some overhead costs, such as labor and utilities, are not strictly fixed costs but have a variable portion that fluctuates with sales volume. Discounting without knowing overhead costs per unit can be, and often is, detrimental to restaurants. Combining ABC with revenue management methods is essential for demand-based pricing in restaurants.

The future of ABC will be its amalgamation with other established management methods, such as revenue management. Future research should reinvestigate restaurant managers' knowledge and use of ABC, and should apply ABC to measure the impact of sustainable practices on costs and restaurants' profitability. Disseminating the benefits of ABC and improving the education process will also spread awareness and use of this technique to strengthen the restaurant industry's performance and profitability.

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APPENDIX. APPLYING ABC IN THE RESTAURANT INDUSTRY

This appendix provides a step-by-step guide to implementing activity-based costing (ABC) in a foodservice operation.

PHASE 1: IDENTIFY AND COLLECT DATA; PERFORM CONTRIBUTION MARGIN MENU ENGINEERING

Step 1

The first step in the ABC process is meeting with managers and employees to explain the ABC concept and its benefits. This discussion should include how to determine the objectives of implementing ABC. Potential objectives include tracing overhead costs to menu items and establishing correct menu item costs. Production processes need to be improved by identifying and reducing non-value-added activities.

Step 2

Next, the restaurant's current pricing method for menu items must be determined. Then select which menu items to analyze. At this time, the concept of menu engineering should be explained.

Step 3

Identify the processes to obtain the necessary data to conduct menu engineering, for example, monthly total sales numbers and food cost for each menu item. The method for obtaining cost information from the General Ledger should also be discussed.

Step 4

Using the data gathered from Step 3, conduct contribution margin menu engineering.

PHASE 2: DESIGN THE ABC SYSTEM

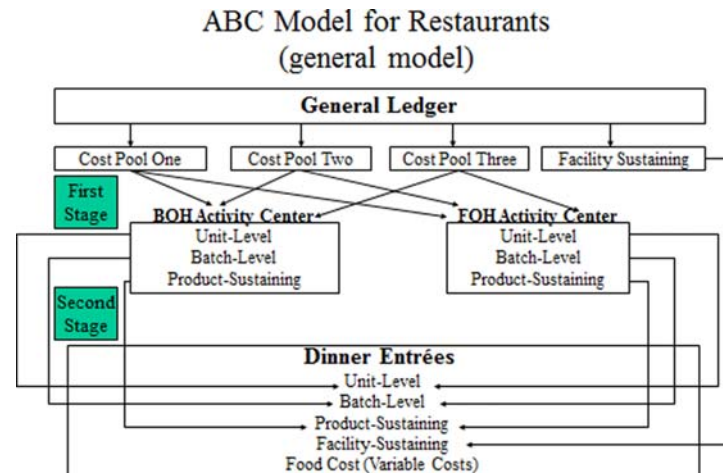
The next phase is to design the ABC system for a restaurant operation. [Appendix Figure 1](#) represents a generic restaurant ABC model adapted from Cooper and Kaplan (1988).

Step 1

The restaurant's activities must be identified and flow-charted. Each step is labeled as either value-added or non-value-added. Here, only activities that actually produce the product or provide service to the customer are value-added (Raab & Mayer, 2004). Major activities in the restaurant industry include purchasing, receiving, storing, preparing food, cooking, cleaning, setting up dining room, seating customers, taking orders, ordering, serving food and beverages, maintaining tables, cashing out customers, and communicating with customers.

Step 2

Activity centers are then created, which are established by combining homogenous processes. For most restaurants, activity centers are created separately for the FOH and the BOH areas. Each area's activities can be combined into activity centers, such as back of the house (purchasing, receiving, storage, preparation and cooking) and front of the house (seat people, take reservations, take orders, order on the POS system, serve food and beverages, make beverages, table maintenance, cash out customers, customer communication, set tables, set side stations, fold napkins, polish silver).



APPENDIX FIGURE 1. General ABC model for restaurants (adapted from Cooper & Kaplan, 1988).

Step 3

Next, examine overhead costs in the general ledger. Separate overhead costs into homogeneous cost pools. Homogeneous cost pools are a collection of overhead costs for which cost variations can be explained by a single cost driver, where related accounts sharing a common purpose are combined. For example, wages and employee benefits can be combined in an account called “costs of personnel,” which will be assigned to activities using a single cost driver (hours worked in FOH and BOH).

In Figure 1, restaurant overhead costs are displayed as part of the cost pools derived from the general ledger. According to the 2002 Uniform System of Accounts for Restaurants, overhead costs include salaries and benefits, direct operating expenses, music and entertainment, marketing, utility service, general and administrative expenses, repair and maintenance, security, insurance, landscaping, and occupancy costs.

Step 4

On the basis of the two-stage model shown in Figure 1, the next step involves assigning overhead costs to activity centers. In restaurants, one overhead cost pool can be “cost of personnel,” which includes the total costs of all wages and all employee benefits. This cost pool is assigned to a department (e.g., FOH or BOH) by determining how much of it is incurred by each department. The cost driver “numbers of hours spent” incorporates the hours spent on all phases of producing food. To trace this cost to the activity center “back of the house,” all personnel costs incurred for the BOH are divided into the expected action of the activity center, that is, the average hours worked in food production. Assuming the total cost for the food production-related staff is \$10,000 per month, and the food production staff worked 1,600 hr per month, the pool rate equals \$6.25 per hour worked (\$10,000/1600 hr).

This pool rate is applied in the second stage of the costing process to determine how much of the “cost of personnel” is used by each individual product (menu item). The same procedure is conducted for the FOH.

Other overhead pool costs are classified as facility-sustaining costs, where no cost drivers can be determined. These types of

overhead costs cannot be traced to the product by means of activity centers, and are allocated by means of some arbitrary base, such as the number of items sold during the time period analyzed.

Step 5

The next step is to establish second stage cost drivers by dividing the total costs of each activity center (FOH and BOH) into cost driver pools. Activities are hierarchical, and unit cost drivers enable activities to be grouped into four categories: unit-based, batch-related, product-sustaining, and/or facility-sustaining.

Unit Cost Drivers. These occur any time a unit is produced; they are directly related to the number of units produced. The number of employee hours and units of utilities used are unit-based cost drivers applicable to the restaurant industry. For example, each time a guest orders a meal, labor hours are consumed by unit activities, such as taking the order and preparing and serving the meal. Utilities (electricity, natural gas) are used to produce the meal, and a unit-based driver is used to measure the units of utility used per meal cooked.

Batch Cost Drivers. Examples of batch activities in a restaurant are *kitchen line setup* and *purchasing supplies*. The number of setups and the number of times supplies are ordered are considered batch cost drivers. Batch drivers are not used in traditional cost systems but are appropriate in restaurants.

Product-Level Drivers. These signify resources consumed by product-level activities that sustain products in the company’s product line. Examples of product-level activities in the restaurant business include establishing and maintaining specifications, recipe testing, and expediting food production.

Facility-Sustaining Activities. This final category contains costs that sustain a company’s general processes, such as accounting, marketing, property taxes, security, and landscaping.

Step 6

Assigning cost driver pools to products. Each of the cost driver pools has its cost assigned to products using a second-stage cost driver unique to each cost pool. A cost driver pool is assigned to products on the basis of the number of cost driver units it consumes. The overhead cost applied to the product is calculated

by multiplying the number of cost driver units with the cost pool rates established in Step 4.

Using the restaurant industry example, the pool rate calculated for the activity center *food production* was \$6.25 per hour worked. The activity center is now deconstructed into the different levels of activities. For example, to produce menu items, unit-based cost drivers will be applied for time spent to prepare and cook a menu item and the kilowatt-hours of power used to do so. However, other levels of activities need to be considered. For example, batch-level activities, such as line setup and purchasing, and product sustaining activities, such as recipe costing and establishing and maintaining specifications, must be considered. The amount of resources consumed for each product is measured and listed in a bill of activities.

Measuring Units of Resources Consumed by Products.

Observation and interview methods can be used to measure the units of resources consumed by a product. Observers and/or interviewers will learn how long it takes to perform each activity and how many employees are performing it. For example, in a restaurant, an observer can learn how many people set up the cooking line in the BOH and how long it takes to do so. A cost per menu item can be established by dividing the total labor cost by the amount of time used to set up the line. Assuming two cooks set up the line every day and it takes 1 hr, the cost for each menu item per setup can be calculated as follows: $\$6.25 \times 1 = \6.25 (cost pool rate \times number of units used) and $\$6.25/50$ (number of menu item) = \$0.13. This means that the bill of activities should include 13 cents as setup costs incurred in the BOH.

Other resources that need to be considered to establish product costs are unit-based drivers, such as the number of units of power and labor hour units that are used to prepare a particular menu item. The time spent on labor hours to prepare the item is obtained by observation or interviews with the food production staff. For example, if the item takes 2 min of prep work and 10 min to cook, the total amount of labor applied to the menu item is 12 min. To determine the unit-based labor costs, the pool rate of \$6.25 established earlier is divided by 60 to establish the cost per minute ($\$6.25/60 = \0.10). Therefore, the unit-based labor cost for this item equals $\$1.20$ ($12 \text{ min} \times \$0.10 = \1.20).

The product-level cost is established in the following way: First, assuming interviews reveal that 10 hr per month are spent on recipe testing, this activity has a total cost of \$62.50 a month (cost pool rate \times 10 hr). To establish the cost per menu item, the total cost is divided by the total average number of menu items sold each month. Assuming an average of 3,000 items are sold per month, the cost per item equals \$0.03 ($\$100/3,000 = \0.03). While many managers may consider these low costs to be immaterial, and may not be considered on their own, these small incremental costs may be significant if all product-sustaining costs are considered.

The same procedure is used to estimate the cost of expediting. For example, if the restaurant employs two full-time expeditors working 160 hr per month, the cost equals \$1,000 (i.e., $160 \text{ hr} \times \$6.25/\text{hr}$) and the average cost per menu item for these product-sustaining costs equals \$0.33 ($\$1,000/3,000 \text{ items}$).

Step 7

Bills of activity. ABC costs calculated for products are usually condensed into bills of activity. The bill lists each cost and activity associated with a product occurring in each activity center. The bill may also include information about the value of an activity. A bill of activity considering only the cost traced from the "personnel cost" cost pool for the BOH establishes the following costs for a particular menu item:

1. Unit-based labor cost = \$1.20, per menu item,
2. Batch-level cost (set-up) = \$0.13, and
3. Product-level cost (e.g., expedition, recipe costing) = $\$0.03 + \$0.33 = \$0.36$.

Total resources consumed by one menu item, as traced from the personnel cost pool based only in the BOH activity center food production, equal \$1.69 ($\$1.20 + \$0.13 + \0.36). The same procedures are applied to assign all other overhead cost pools (e.g., utility costs), except for facility-sustaining costs (accounting, general and administrative expenses, insurance, security, landscaping, direct operating costs, occupancy costs, and depreciation) that must be allocated arbitrarily, similar to traditional methods. For example, the total value of the facility-sustaining cost pool can be divided by the total average number of menu items sold per month and then applied to each menu item. If the total facility-sustaining cost is \$15,000 per month and 3,000 menu items are sold, the cost per item equals \$5.00, which means that each menu item will have added \$5.00 to its bill of activity. In addition, food cost is added to each menu items' bill of activity and the sum of all costs of all levels of activities (unit-level, product-sustaining, batch-level, and facility-sustaining costs) plus the item's food cost will then establish ABC cost for the menu

APPENDIX TABLE 1. Bill of Activity for Filet Mignon

Activities	Resources used (minutes)	Cost pool rates (\$/minute)	Total cost (\$)
Unit-level activities			
Front of house			
Communicating	1.2	0.18	\$0.22
Setting up	1	0.18	\$0.18
Serving customers	1	0.18	\$0.18
Processing checks	1.45	0.18	\$0.26
Total	4.65		\$0.84
Back of house			
Preparation	2	0.074	\$0.15
Cooking	5	0.074	\$0.37
Cleaning	1	0.074	\$0.07
Total	8	0.074	\$0.59
Total unit-level activities	12.65		\$1.43
Batch-level activities			
Front of house			
Setting up	3.2	0.18	\$0.58
Cleaning	1.59	0.18	\$0.29
Administrating	3.83	0.18	\$0.69
Total	8.62	0.18	\$1.55
Back of house			
Preparation	7.2	0.074	\$0.53
Cleaning	0.5	0.074	\$0.04
Total	7.7	0.074	\$0.57
Total batch-level activities	16.32		\$2.12
Product-sustaining activities			
Front of house administrating	2.55	0.18	\$0.46
Back of house administrating	3.21	0.074	\$0.24
Total product-sustaining activities	5.76		\$0.70
Facility-sustaining activities			
Food costs	1 unit	5.02	\$5.02
Food costs	1 unit	9	\$9.00
Total cost			\$18.27

item. An example of a complete bill of activity for a full-service fine dining restaurant is displayed in [Appendix Table 1](#).

Step 8

ABC menu engineering is conducted. ABC menu engineering uses a process similar to contribution margin menu engineering. The major difference between the two is that ABC menu engineering is based on the ABC cost and evaluates each menu item on the basis of operating profit (Price – ABC Cost) instead of only looking at contribution margins, as per traditional contribution margin menu engineering analysis.

Step 9

Process and organizational improvement. The results of the ABC analysis are used to improve the menu and the organization

as a whole. Managers can use this information to reevaluate which menu items to retain and which items to reprice according to market conditions and customer demand. The information should be shared with the employees to conduct activities in a more efficient manner.

The data collected should be updated routinely when overhead costs change, and menu items should be repriced accordingly. Management may concentrate on market segments that purchase the most profitable items. Last, all menu items that are unprofitable should be eliminated, except for items that are priced low for promotional purposes. Processes that do not add value need to be eliminated or reengineered. Once employees and management comprehend the potential opportunities of an ABC system, they can manage the restaurant and execute tasks in a profitable manner while delivering value to the customer, and adding to the sustainability of the organization.