

Labor and menu category: Effects on analysis

by Brett W. Horton

Menu analysis is the gathering and processing of key pieces of information to make it more manageable and understandable. Ultimately, menu analysis allows managers to make more informed decisions about prices, costs, and items to be included on a menu. The author discusses if labor as well as food costs need to be included in menu analysis and if managers need to categorize menu items differently when doing menu analysis based on customer eating patterns.

Menu analysis can focus on various elements of the menu, including layout and design, menu variety, item arrangement and location, item description, sales techniques, and pricing.¹ A variety of financial menu analysis techniques have been suggested to assist managers in better understanding the popularity and profitability of items served. Some of the earliest writing on this topic is by Miller² who developed a matrix model that used menu item popularity and food cost to assist managers in the develop-

ment of a more profitable menu.

Another financial menu analysis technique, menu engineering, has been around for about 20 years. Menu engineering is “a tool designed to improve managerial effectiveness in pricing, content, design, and marketing strategies.”³ Kasavana and Smith⁴ discussed a matrix approach to evaluating individual menu items based on menu popularity and individual item contribution margins (menu item price less food cost). The menu engineering model by Kasavana and Smith⁵ segments a menu into four quadrants based on an item’s contribution margin and its popularity relative to all other items on the menu. Menu items with above-average contribution margins are designated either “stars” or “puzzles,” and menu items with a menu mix percentage at, or above, 70 percent of average sales are designated as either “stars” or “plowhorses.” Items with

a below-average contribution margin and menu mix percentage are designated as “dogs.”

This general menu engineering model was modified when Pavesic⁶ developed a cost/margin analysis model that included food cost percentages and a weighted contribution margin that included item popularity and item contribution margin. The premise of the cost/margin analysis model is to simultaneously optimize dollar contribution margin and total sales revenue while lowering overall food cost percentages.

Other costs included

Hays and Huffman⁷ developed a profit and loss statement for each menu item, which began the exploration of including costs other than food costs in menu analysis. The authors assessed each menu item with an equal absolute share of fixed costs and an equal percentage share of variable costs. LeBruto, Quain, and Ashley⁸ expanded the menu analysis concept of including a labor cost component by increasing the categories from the typical four quadrants to eight. Their model suggested each menu item as being either high or low in labor costs, in addition to the traditional four categories, based on menu mix percentage and contribution margin. The authors suggested, however, that any quantitative method to determine variable labor costs is suspect. Despite their inclusion of labor in their menu analysis model, the increase from four to eight categories altered

the parsimony of the previous models, a key attribute to operational implementation.

New factors emerge

Financial menu analysis is designed to classify menu items based on characteristics that differentiate one menu item from another. As a result, only differential costs should be included in a menu analysis model. Inclusion of labor costs data in operational menu analysis assumes labor is a differential cost, and also assumes that labor costs for each item can be obtained accurately and inexpensively. Previous financial menu analysis models have usually excluded labor costs for violation of one or more of these assumptions. Furthermore, many menu analysis techniques assume menu items can and should be differentiated from each other based on their location or category on a menu (starters, entrees, and sandwiches). This assumption is based on the premise that guests view a meal as having these components and therefore order accordingly.

Major changes have occurred in the restaurant industry since the original menu analysis models were developed. First, labor has become increasingly more costly and difficult to find; second, restaurant patron dining habits have changed, and, third, prepared or partially prepared menu items have become more readily available and acceptable than ever before. This analysis was designed to increase understanding of menu

analysis by exploring two key issues. The objectives were to determine the impact of variable labor costs on menu item profitability and the impact of changing menu categories on menu analysis results. Both issues impact the quality of information a manager has available to make decisions that impact a restaurant's contribution margin and subsequent profit.

Small town used

Data from an independent restaurant operation in a small Midwestern town serving breakfast, lunch, and dinner were used for this study. The restaurant seats 150 customers and has a banquet room with seating for another 75 customers. Sales data for lunch and dinner over a one-month period were obtained from the point-of-sale system. Data were not separated by meal period, as managers believed guests ordered from all aspects of the menu during all hours of operation.

Raw food cost was calculated for each menu item. The manager priced each food item with two full-line vendors, and the lower of the two costs was used in the calculations.

Labor cost was calculated for each menu item by timing active preparation time, defined as the time spent working on a single menu item that could not be utilized to accomplish any other task. For example, when timing hamburger preparation, the timing included the time it took to place a

raw hamburger on the grill (frozen patties were purchased), turn the hamburger, assemble the condiments, place accompaniments (fries) on the plate, finish assembling the plate, and place the plate in the window for pick-up. Hamburger preparation took three minutes. The hamburger preparation time did not include the time it took for the hamburger patties to cook, as the employee was working on other products during this time. Deviations may occur, but the deviation should remain proportionate to other menu items. For example, if during the busy times a hamburger only takes 2.5 minutes to prepare, compared to three minutes, a savings of 16.7 percent, then other items would also mostly likely be produced 16.7 percent faster.

The wage in this particular restaurant was \$7 an hour for the line cook. Therefore, the labor cost for the hamburger was set at 35 cents. In some instances, only the sous chef could prepare an item, i.e., hand trim the beef filets. In such instances, the sous chef's rate of pay was applied to the menu item for that portion of production.

Variable costs exist

Two variable costs were determined for each menu item, one that included only variable food cost (VC/F) and another including both variable food and variable labor cost (VC/FL). Two contribution margins for each menu item were calculated as sales price less variable costs and were identified as

CM/F when using only variable food costs and CM/FL when using both variable food and variable labor costs. Food cost percentage was calculated for each menu item as food cost divided by sales price. Furthermore, labor cost percentage was calculated for each menu item as labor cost divided by sales price. Food and labor cost percentages were calculated by category as the sum of the food or labor costs for items in that category divided by total sales for that category.

Fifty-two menu items (all food items except desserts) were included in the menu analyses. Several matrices were developed to assist with the analyses. Matrices were developed to place menu items

into one of four quadrants based on popularity and contribution margin. Similar to previous menu analysis matrices, a popularity threshold was developed; this was equal to 70 percent of the total menu items sold in any given category divided by the total menu items offered in any given category.⁹ The contribution margin threshold was the average of sales price less variable cost. Quadrants were labeled as low popularity, low contribution margin (*p/cm*); low popularity, high contribution margin (*p/CM*); high popularity, low contribution margin (*P/cm*); and high popularity, high contribution margin (*P/CM*) (see Figure 1).

First, two separate matrices

Figure 1
General menu analysis matrix

High P%	<i>P/cm</i>	<i>P/CM</i>
	<i>p/cm</i>	<i>p/CM</i>
Low p%		
	Low cm	High CM
	Contribution margin	

Note: p or P = popularity = number of individual menu items sold/total number of menu items sold in a category

Popularity Threshold = (total menu items sold/ total menu items offered)

*70 percent¹⁰

p = less than popularity threshold

P = greater than popularity threshold

cm or *CM* = Contribution Margin = Sales Price – Variable Cost

Contribution Margin Threshold = Average (sales price – variable cost)

cm = less than contribution margin threshold

CM = greater than contribution margin threshold

were developed to examine differences in using CM/F or CM/FL to evaluate menu item profitability. Exploring the impact of changing menu categorization involved the creation of five matrices:

- the total menu
- starters only
- salad and sandwiches only
- entrees with salad and sandwiches
- entrees without salad and sandwiches.

Dining habits calculated

All matrices were based on using CM/FL in calculations. The rationale for the different categories was to assist management in evaluating the impact of customer dining patterns relative to menu categories. For example, if customers were eating salads and sandwiches for lunch and entrees for dinner, then dividing the menu into two separate categories and developing one matrix for salads and sandwiches and a second for entrees makes sense. However, management believed that customers were substituting starters, salads, and sandwiches for entrees at dinner and starters for salads and sandwiches at lunch; they therefore believed there was a need to develop matrices that could examine these different categories. Due to the inability of management to group data by meal period, a total menu analysis was conducted as a benchmark.

The menu examined in this study was served from 11 a.m. until the restaurant closed at 10 p.m. and included four categories: 15 starters, 10 salads, 12 sandwiches, and 15 entrees. The use of VC/FL as opposed to VC/F to calculate menu item contribution margins resulted in six of the 52 (11.5 percent) menu items changing classification. Dividing the menu into three categories (starters, salads and sandwiches, and entrees) resulted in 32 of the 52 (61.5 percent) individual menu items changing classification when compared to the total menu. These findings highlight the impact of variable labor costs on menu item classification and the impact of changing menu categories on menu classifications.

Managers are hesitant

In several instances, restaurant managers have been hesitant to attempt menu analysis, citing the time it would take to gather the necessary information. In this study, the manager and chef completed labor timing for all 52 items in 2.5 hours. Timing occurred during a slow period for the restaurant so that actual times were used for some items, whereas in other instances the food was prepared to facilitate timing. The manager spent 15 hours calculating the food costs for all 52 menu items. The entry of items in the spreadsheet and calculation of food and labor costs took the manager and chef 20 hours. Although the manager was provided with a copy of the spread-

Table 1
Change in menu classification due to inclusion of labor cost

Menu Item	Classification	Classification	Menu item	Contribution
	CM/F	CM/FL	labor cost %	margin
SC shrimp	<i>p</i> /CM	<i>p</i> / <i>cm</i>	15.5	\$ 3.84
1/2 doz. Rockefeller . . .	<i>p</i> /CM	<i>p</i> / <i>cm</i>	10.0	\$ 4.04
Cobb salad	<i>p</i> /CM	<i>p</i> / <i>cm</i>	19.5	\$ 3.72
Burger B	<i>P</i> / <i>cm</i>	<i>P</i> /CM	5.6	\$ 4.23
Burger P	<i>P</i> / <i>cm</i>	<i>P</i> /CM	5.9	\$ 4.22
Average			8.56	\$ 4.76

Note: *p* or *P* = popularity = number of individual menu items sold/total number of menu items sold in a category

Popularity Threshold = (total menu items sold/ total menu items offered)

*70 percent¹¹

p = less than popularity threshold

P = greater than popularity threshold

cm or CM = Contribution Margin

CM/F = Contribution Margin Food = Sales Price – Variable Food Cost

CM/FL = Contribution Margin Food and Labor = Sales Price – (Variable Food Cost + Variable Labor Cost)

Contribution Margin Threshold = Average (CM/F) or Average (CM/FL)

cm = less than contribution margin threshold

CM = greater than contribution margin threshold

Labor cost % = Σ (Labor Cost) / Σ (Sales)

sheet and had a good understanding of how to calculate food costs, this was the first time the manager had used a menu analysis spreadsheet.

Labor has impact

Six menu items changed classification due to the inclusion of labor costs in the menu analysis; four menu items dropped in classification based on contribution margin, and two increased classification based on contribution margin (see Table 1). These results suggest that two things must exist for labor to have enough of an impact on a menu item to change its classifica-

tion. First, the item must be close to the average contribution margin percentage line, and, second, the labor cost percentage of an item must be much different from the average labor cost percentage. Those items changing classifications were 12 to 37 cents from the average contribution margin of \$4.76 and varied 3-11 percent in labor cost from the menu average of 8.6 percent.

The food cost percentages ranged from 29.8 percent for salads to 33.7 percent for entrees. Labor cost percentages ranged from 5.8 percent for starters to 16.5 percent for salads (see Table 2). Despite

relatively few changes in menu item classifications due to the use of VC/FL versus VC/F in contribution margin calculations, the labor cost percentage for salads was markedly higher than all other categories. In one instance, Cobb Salad, the labor cost of \$1.16 was 9 cents more than the food cost of \$1.07, again emphasizing the importance of inclusion of labor cost in menu analysis.

Such results suggest that menu items that require very limited or excessive labor time for preparation might not be categorized appropriately using one of the traditional menu analysis tools cited in the review of literature. Furthermore, the fact that inclusion of labor cost did impact the contribution margin classification of several menu items suggests the importance of managers periodically examining the labor time spent to prepare items. Managers should especially focus on unpopular items that require extensive labor time for preparation; these items may need to be eliminated from the menu or altered to include less labor time.

In general, changing menu

categories had a major impact on menu classification. The fewer the number of menu items included in the menu analysis, the better the overall classification of an individual menu item; however, variations did exist. During the process of analyzing the menu, the total menu was broken into four separate categories:

- starters
- salad and sandwiches
- inclusive entrees (entrees, plus salads and sandwiches)
- exclusive entrees (entrees only, no salad and sandwiches).

Menu item classifications were compared based on these four categories.

Starters are popular

Seven of 15 menu items changed classifications when analyzed separately against only other items in the "starter" menu category (see Table 3). As is evident, and expected, items that were not profitable or popular when

Table 2
Food and labor cost percentages by menu category

Category	Cost as a percentage of sales		
	Food cost	Labor cost	Variable cost
Starters	35.4%	5.8%	41.6%
Salads	29.8%	16.5%	45.5%
Sandwiches	32.1%	7.8%	40.3%
Exclusive entrees	33.7%	6.7%	41.9%

Note: Food cost % = $\sum (\text{Raw Food Cost}) / \sum (\text{Sales})$

Labor cost % = $\sum (\text{Labor Cost}) / \sum (\text{Sales})$

Variable cost % = $\sum (\text{Raw Food Cost} + \text{Labor Cost}) / \sum (\text{Sales})$

Table 3
Comparison of menu analysis for items categorized as starters^a

Total menu ^b		Starter		
Menu item	Classification CM/FL	Classification CM/FL	Popularity %	Contribution margin
Chicken wings	<i>P/cm</i>	P/CM	13.1 %	\$4.02
Nachos with beef	<i>P/cm</i>	P/CM	5.9 %	\$3.72
Nachos with chicken	<i>p/cm</i>	<i>p/CM</i>	2.9 %	\$3.39
Spinach/artichoke dip	<i>p/cm</i>	<i>P/cm</i>	7.6 %	\$2.89
SC Shrimp	<i>p/cm</i>	P/CM	6.9 %	\$3.84
1/2 doz. Rockefeller	<i>p/cm</i>	<i>p/cm</i>	1.9 %	\$3.89
1/2 doz. Oysters	<i>p/cm</i>	<i>p/CM</i>	0.6 %	\$4.04
Average			4.7 %	\$3.17

Note: a) Table only includes menu items where classification changed
b) Total Menu Classification includes analysis of all 52-menu items
c) Starter Classification includes analysis of 15 items
p or *P* = popularity = number of individual menu items sold/total number of menu items sold in a category
Popularity Threshold = (total menu items sold/ total menu items offered)*70 percent¹²
p = less than popularity threshold
P = greater than popularity threshold
cm or *CM* = Contribution Margin = Sales Price - (Variable Food Cost + Variable Labor Cost)
Contribution Margin Threshold = Average (Sales Price - (Variable Food Cost + Variable Labor Cost))
cm = less than contribution margin threshold
CM = greater than contribution margin threshold
CM/FL = Contribution Margin = Sales Price - (Variable Food Cost + Variable Labor Cost)

compared to the total menu were both profitable and popular as starters. Seven starters improved classification when compared to other starters. Moreover, two items moved from low popularity/low contribution margin (*p/cm*) to high popularity/high contribution margin (*P/CM*), a dynamic change possible only by improving the popularity and profitability relative to other menu items.

The past paradigm that only

items in similar menu categories should be analyzed together fails to account for the shift in the eating style of guests. Due to the increase in portion sizes offered in many restaurants, a starter often is sufficiently satisfying, and may be robbing an operation of valuable contribution margin dollars. This occurs when starters replace entrees as center-of-the-plate options for guests searching for less food.

Five starters were classified as "P/cm" in the total menu analysis. Unless management is certain that these items are not being ordered in lieu of sandwiches or entrees, they should be included in a larger menu category analysis. Starter popularity ranged from 1 to 19 percent of total number of starters sold. Moreover, seven of the starters had a starter's popularity of less than 3 percent. Such findings suggest that a substantial number of starters were being carried on the menu that, although profitable, lacked popularity. Removing, re-pricing, or changing unpopular items likely will create a substantially different set of classifications in a new analysis conducted on a new menu.

Salads, sandwiches included

Menu analysis matrices were developed for three "entree" categories: inclusive entrees (entrees, plus salads and sandwiches), salad and sandwiches, and exclusive entrees (entrees only, no salad and sandwiches). Item classifications in the salad and sandwich category and exclusive entree category were compared to the inclusive entree category. Management believed that salads and sandwiches were being substituted for entrees at dinner. This analysis helps to demonstrate the differing results based on different menu categories.

Menu analysis of a smaller salad and sandwich category compared to the larger inclusive entree category improved the relative popularity and profitability of certain items (see Table 4). Six

menu items changed from "p/cm" to "P/CM" and two menu items changed from "p/cm" to "p/CM." These changes were expected. Inclusion of more expensive items in the category would make sandwiches less profitable relative to the entrees. The last classification change of three menu items from "p/CM" to "P/cm" is the most difficult to interpret, supporting the importance of understanding the effect of the menu category on menu item classification and the consequential impact on decision-making.

Analysis of the exclusive entree category relative to the inclusive entree category changed the classification of seven of the 15 "entrees" (see Table 4). In most instances, the change in classification was to a lower one. This was expected because a category with fewer entrees creates a higher contribution margin threshold. Two items changed from "P/cm" to "p/cm," two from "P/cm" to "p/CM," two from "P/CM" to "p/CM," and one from "P/cm" to "P/CM."

Each of the classification changes would likely prompt management to make a different decision relative to an individual menu item, therefore highlighting the importance of understanding what a restaurant's clientele considers an "entree" and how changing the "entree" category affects management decision-making. Dependent upon how menu categories are divided, the categories likely will have a drastic impact on how management

Table 4
Effect of menu category on menu item classification

Menu Item	Inclusive entree category ^a	Salad & sandwich category ^b	Exclusive entree category ^c
Cobb salad	<i>p/cm</i>	<i>p/CM</i>	
W/rib eye	<i>P/cm</i>	<i>p/CM</i>	
W/shrimp	<i>P/cm</i>	<i>p/CM</i>	
Grilled chx salad	<i>P/cm</i>	<i>P/CM</i>	
Oriental steak salad	<i>P/cm</i>	<i>p/CM</i>	
Spinach salad	<i>P/cm</i>	<i>p/CM</i>	
Burger B	<i>p/cm</i>	<i>P/CM</i>	
Burger P	<i>p/cm</i>	<i>P/CM</i>	
Patty melt	<i>p/cm</i>	<i>P/CM</i>	
Cajun chicken	<i>p/cm</i>	<i>P/CM</i>	
Grilled chicken	<i>p/cm</i>	<i>P/CM</i>	
Chicken tenders	<i>p/CM</i>	<i>P/CM</i>	
Grilled tuna	<i>p/CM</i>	<i>P/CM</i>	
Philly ribeye	<i>P/cm</i>	<i>P/CM</i>	
Pork tenderloin	<i>P/cm</i>	<i>P/CM</i>	
Chicken Madeira	<i>p/CM</i>		<i>P/cm</i>
Pork medallions	<i>p/CM</i>		<i>P/CM</i>
Fettuccine Alfredo	<i>P/CM</i>		<i>P/cm</i>
Mediterranean	<i>P/CM</i>		<i>P/cm</i>
Sausage primavera	<i>p/CM</i>		<i>p/cm</i>
Tomato chx pasta	<i>p/CM</i>		<i>P/cm</i>
Vegetarian pasta	<i>p/CM</i>		<i>p/cm</i>
Food cost percent	32.1 %	31.1 %	33.7 %
Labor cost percent	9.7 %	11.6 %	6.7 %

Note: a) Inclusive Entree Category includes salads, sandwiches, and traditional entree items

b) Soup & Sandwich Category includes just soup and salads

c) Exclusive Entree Category includes only traditional entree items

p or *P* = popularity = number of individual menu items sold/total number of menu items sold in a category

Popularity Threshold = (total menu items sold/ total menu items offered)*70 percent¹³

p = less than popularity threshold

P = greater than popularity threshold

cm or *CM* = Contribution Margin = Sales Price – (Variable Food Cost + Variable Labor Cost)

Contribution Margin Threshold = Average (sales price – (Variable Food Cost + Variable Labor Cost))

cm = less than contribution margin threshold

CM = greater than contribution margin threshold

Food Cost percent = Σ (Raw Food Cost) / Σ (Sales)

Labor Cost percent = Σ (Labor Cost) / Σ (Sales)

approaches improving the relative contribution margin and popularity of any given menu item.

Three important conclusions can be drawn from this operational research project using financial menu analysis. First, including labor costs (VC/FL) in menu item contribution margin calculations had an effect on the menu classification of six of the 52 menu items. This was not a substantial effect in this operational case example, yet such results suggest that labor cost may be an important item to consider in future studies, especially since the labor cost percentages were strikingly different by category.

Second, changing the menu categories had a dramatic effect on the classification of an item. Items that were classified as "*p/cm*" when the total menu was examined were classified as "*P/cm*," "*p/CM*," and even "*P/CM*" when the menu categories were changed. Third, information such as food and labor cost percentages by category, which usually are not included in traditional menu matrices analysis, could have a substantial effect on interpretation of results and, consequently, management alternatives.

Pitfalls are noted

The results of this single restaurant analysis suggest several pitfalls that operators must be aware of as they develop their operation's menu. If consumers view starters on a menu as a comparatively good value to salads and sandwiches for lunch, management

must consider two options: reduce the size of the starter so that it is viewed as just that, a starter, or price the starter so that its contribution margin makes it comparable to the salads and sandwiches it is replacing. If a manager chooses the first option, the reduction in price and portion size will create a distinct menu category that should be analyzed separately from salads and sandwiches. However, if starters are being consumed in lieu of salads and sandwiches, they should be analyzed in combination with salads and sandwiches.

In a similar vein, if salads and sandwiches are replacing entrees at dinner, the management team has several options. The most rational option, and one that is observed, is developing two separate menus: a lunch menu featuring salads and sandwiches, and a dinner menu featuring entrees with appropriate starters. Managers must beware, however, of the same potential dilemma faced at lunch if the starters become a comparatively better value than the entrees. A second option, and one that also is observed, is pricing starters so as to achieve a comparable contribution margin to salads, sandwiches, and even entrees. The repercussion is that customers often order only a single menu item and all menu items must be included in the menu analysis.

Clientele needs vary

In the highly competitive restaurant business, managers must be aware of the changing

demographics of their clientele. As the "boomers" get older, their appetites may begin to wane and couples may begin to split entrees with or without a starter. Generation X and/or Generation Y patrons have a tendency to "graze," putting pressure on management to increase the contribution margin of each seat, let alone each "entree." Understanding the restaurant's clientele may allow operators to reduce the overall size and price of all menu items to increase overall contribution margin. Operators may choose to follow the lead of many Italian restaurants and offer two portion sizes to encourage each diner to order an entree and split a starter and dessert.

Future menu analysis studies should examine the overall contribution margin of seats versus individual items, preferably by meal period. If relatively low contribution margin starters are being paired with medium to high contribution margin entrees, then more profit may be obtained by encouraging this pairing, rather than discouraging it by raising prices and increasing portion size. The use of menu analysis as a decision tool is important to maximize contribution and overall profit, but it is just that – a tool. It must be used to guide decisions, some of which incorporate information beyond the scope of the model. However, past models that evaluate the menu based on predetermined categories without giving thought to how the customers are

dining in a particular restaurant may be providing inaccurate information to managers.

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Brett W. Horton is assistant professor in Hotel, Restaurant, and Institution Management at Iowa State University.