

Design of Operational Strategy with Variable-Costing-Based Menu Engineering Information System for Restaurants in Surabaya

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Abstract. Restaurant management is always trying to sell a menu that has a high level of sales with a high level of profit as well. Actually, there tends to be a difference in the level of popularity and the level of profit contribution from each menu. The level of popularity is determined by the percentage of sales of the menu compared to total sales, while the level of profit contribution is calculated by the variable costing method. Variable costing is the determination of the cost of production, which only charges variable production costs into the cost of the product. The cost of the product, according to the variable costing method, consists of the cost of raw materials, variable labor costs, and variable restaurant overhead costs. The research was carried out with a case study in a Chinese food restaurant in Surabaya with a monthly turnover of Rp180,000,000.00 to Rp 200,000,000.00. The research was intended to determine the operational and marketing strategies of each menu through an information system created based on the calculation of variable costing and popularity. The author conducted a field study, namely by collecting data directly from the restaurant with the method of observation and interviews with management. The author uses the information system as a means of determining the mapping of each menu to be classified into 4 clusters: Star, Plow horse, Puzzle, and Dog. From this mapping, there were five menus classified as Star, ten menus classified as Plow horse, 13 menus classified as Puzzle, and seven menus classified as Dog. The results of the mapping provide marketing and operational strategy recommendations for each menu at the restaurant

Keywords: restaurant, menu engineering, variable costing, information systems.

1. INTRODUCTION

The culinary world is developing rapidly in Indonesia, especially in urban areas. The development of the cafe and restaurant sector business in the east of Java alone is estimated to grow by 20% in 2019[1]. With the increasingly fierce culinary business competition, forcing restaurants to use information technology that is able to support work activities quickly and accurately. Information technology plays an important role in handling business today because of the need for an

automated system so that businesses run faster, have more accurate calculations, and can support decisions that are right on target, especially in data collection about the popularity and cost of a menu.

In calculating costs, the variable costing approach, known as contribution approach, is an income statement format that groups costs based on cost behavior where costs are separated according to variable cost categories and fixed costs and are not separated according to production, administration, and sales functions. Variable costing has several advantages, including: can be used as

an operational planning tool, determining the selling price, determining the break-even point or the return point of principal, and management control tools.

Reports that are registered with the variable cost are far more effective than full costing for management control. This is because these reports can be linked more directly to profit targets or budgets in the relevant period. Deviations from specified standards can be more easily identified and corrected more quickly. In addition to that the variable costing can be clearly demonstrated responsibility in accordance with the organizational line, individual pretensions can be evaluated from the current period.

Based on this understanding, in this study, the author wants to create a sales information system that helps the sales process at a place to eat while setting the cost of goods sold using variable costing to get more accurate results.

1.1. Related Work

Some of the research that participated as references in this study include:

INFORMATION SYSTEM

Broadly speaking, an information system is a system created to provide information in decision making for management and in the context of carrying out organized operations and procedures. as for some understanding of information systems according to experts as follows:

- Alter believes that information systems are a combination of procedures, work, information, people which is organized to achieve goals in an organization [2].
- Gelinas, Orams, and Wiggin argue that an information system is a man-made system that generally consists of a set of computer-based components and manuals that are created to collect, store and manage data and provide information output to users [2].
- Turban, McLean, and Waterbed argue that information systems are systems that collect, process, store, analyze, and disseminate information for specific purposes [2].
- Joseph Wilkinson argues that the information system is a framework that coordinates resources (human, computer) to transform input or output into an output that is the information intended to achieve organizational goals [2].

VARIABLE COSTING

Variable costing is the determination of the cost of production, which only charges variable production costs into the cost of the product. The cost of the product according to the variable costing method consists of the cost of raw materials, variable labor costs, variable factory overhead costs [3]

Raw material costs Rp. Xxx.

Variable labor costs Rp. Xxx.
 Variable factory overhead costs Rp. Xxx.
 Cost of Production Rp. Xxx +.
 Total Cost Rp. Xxx

Variable costing is commonly referred to as direct costing, the term direct costing is not related to the term direct cost (direct cost). Understanding whether or not a direct cost depends on whether or not the cost related to the object of cost determination, for example, product, process, department, and other cost centers, in relation to direct cost products [3].

MENU ENGINEERING

The definition of menu engineering is stated in the book "Computer Systems for Food Service Operations" Michael L. Kasavana cites the function of menu engineering, namely: "menu engineering is a service process through which management can evaluate the current and pricing of menus, designs, and future content ".[4]

From the above resolutions, can be deduced from the menu analysis as a management aid to make and decision in the price, design and contents of the menu for both current and future.

Basically, this menu analysis must discuss each menu item offered to guests. This effectiveness supports the level of popularity and the level of benefits derived from each food (menu item). The results of this analysis are expected to help the management in preparing the menu requested by guests and profitable so that sales targets can be obtained. In the same book, Michael L. Kasavana cites the analysis menu based on two things:[4]

1. Menu Mix (MM) is an analysis of the guests' fondness for food choices in the menu (analysis of the popularity level of each type of food)
2. Contribution Margin (CM) is an analysis of the finances of all types of food on the menu.

After calculating MM% & CM, we classify menu items based on the MM% category and CM category.

The classifications are

1. Dog (MM% low, low CM),
2. Puzzle (MM% low, CM high),
3. Plowhorse (MM% high, CM low),
4. Star (MM% and high CM).

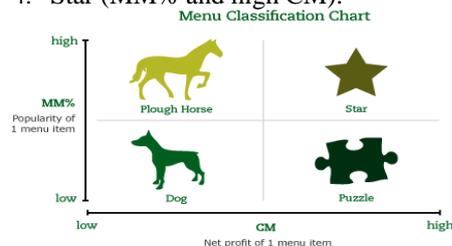


Figure 1 Menu Classification chart based on popularity and Margin

1.2. Our Contribution

This paper will present ways to identify menus that

have low popularity or low profits. The information system will accelerate the identification of these problems in each accounting period. In addition, with variable costing combined with information systems, the data obtained will be more accurate for management policies, both operational and marketing for each menu.

1.3. Paper Structure

The rest of this paper is organized as follows. Section 2 introduces the introduction used in this paper, which tells the situation of the restaurant and the problems encountered. Then, the calculation pattern is entered into the information system in section 3. And section 4 is a conclusion.

2. PROBLEMS AND SOLUTIONS

2.1 Menu Engineering Process

The authors use the Chinese food restaurant data in Surabaya with a monthly turnover of 180,000,000-200,000,000 Rupiahs. From research conducted from January 1, 2020 - February 1, 2020, restaurant sales only reached Rp.173,592,000. This is certainly below the average rating of the restaurant. For this reason, Menu Engineering analysis is needed to be able to know the potential and follow-up actions that must be taken to meet the specified targets.

The twelve menu engineering steps are then performed as follows:[4]

- Stage 1: Identifying competing menu ingredients.
- Stage 2: Record the amount of material sold (used)

$$MM = \frac{\text{menu items sold}}{\text{the amount of total items sold}}$$

Stage 3: Calculate the proportion of mixed menu ingredients. Each sale is divided according to the total number of covers sold which results in a mixed menu

Stage 4: Categorize the percentage of mixed menus (MM%). The high or low category depends on the MM% value obtained. Achievement is determined by adding 80% x1 divided by the number of competing menus (1 / N). The result can be:

- (a) MM% value = $\frac{100\%}{\text{number items}} \times 0.8$
- (b) MM% value > $\frac{100\%}{\text{number items}} \times 0.8$, means high
- (c) MM% value < $\frac{100\%}{\text{number items}} \times 0.8$, means low

- Stage 5: Make a list of menus selling prices.
- Stage 6: Determine standard food prices, sum up the

prices of all ingredients used.

Stage 7: Calculate the contribution of menu item margins. Margin contributions for each ingredient are obtained by reducing the selling price (Stage 5) with the standard cost of food ingredients (Stage 4).

$$CM = \text{Selling Price} - \text{Standard Food Cost}$$

Stage 8: Determine the Margin Contribution (CM) menu. The amount of each CM menu item (Stage 7), multiplied by MM (Stage 2) to determine the total CM menu

Stage 9: Calculate the proportion of material contributed to the margin. Each CM material (Stage 7) is divided by the CM menu (Stage 8) to produce CM% menu material (Percentage of Margin Contributions)

$$CM\% = \frac{\text{menu's margin}}{\text{CM menu}}$$

Stage 10: Classify contribution margin materials. The high or low classification depends on whether it exceeds the average CM value. The value is calculated by dividing the CM menu (Stage 8) by the total amount of material sold (Stage 2). The result can be:

- (a) CM% = CM value
- (b) CM% > CM value, means high
- (c) CM% < CM value, means low

Stage 11: Applying the classifications of MM% category menu items (Stage 4) and CM categories (Stage 10), used to assign menu categories to specific classes.

Stage 12: Propose a decision to maintain, reposition, replace or rearrange the price of menu items

In the research process, there were 35 menus that were assessed for the level of sales and profitability. 35 The menu is divided into 21 Foods & snacks and 14 beverages. Cost calculation follows Variable Costing, so the calculated cost includes Food Cost, Labor Cost, and overhead cost.

We take Aglio Olio' as an example. First, we assign the popularity category through stages 1 to 4. Aglio Olio Menu Mix is 83. After that, look for the percentage of each menu mix, with the formula MM% = Menu mix divided by Total Menu Mix times 100%. MM% Aglio Olio = 83/3568 x 100% = 2.33%. The next stage is to determine the mixed menu category by finding the average mix menu. The formula is 100% / the number of menus x 80% x 100 = 3.8%. In conclusion, the MM category of Aglio Olio is 2.33%, lower than 3.8%.

Secondly, we define the Contribution Margin category. Aglio Olio has selling price Rp.50,000/dish, and the cost takes Rp.35,000/dish. So the margin is Rp.15,000/dish. On the other hand, the total margin divided by the amount of order is Rp.13,674.83. It means the Aglio Olio's margin is higher than the average. Since the MM% is low and CM is high, Aglio Olio is categorized into Puzzle. Since then, Aglio Olio need a

better marketing strategy

Table 1 Menu Classification Result

Menu Item Name	Number Sold	Popularity %	Popularity Category	Item Food Cost	Item Sell Price	Item Profit (E-D)	Profit Category	Menu Item Class
Main Course & Snack								
1 Indomie Goreng / kuah	152	4.26%	High	4,000	12,000	8,000	Low	Plowhorse
2 Indomie Special	221	6.19%	High	17,500	25,000	7,500	Low	Plowhorse
3 Oglio Olio	83	2.33%	Low	35,000	50,000	15,000	High	Puzzle
4 Pork Mee	192	5.38%	High	32,000	45,000	13,000	Low	Plowhorse
5 Pasta	79	2.21%	Low	35,000	50,000	15,000	High	Puzzle
6 Sate babi	301	8.44%	High	20,000	50,000	30,000	High	Star
7 Rice Bowl Pork salted egg	201	5.63%	High	33,000	45,000	12,000	Low	Plowhorse
8 Rice Bowl Pork Original	265	7.43%	High	28,000	45,000	17,000	High	Star
9 Rice Bowl Pork caramalized	330	9.25%	High	33,000	45,000	12,000	Low	Plowhorse
10 Rice Bowl Crispy Chicken	275	7.71%	High	28,000	45,000	17,000	High	Star
11 Rice Bowl Crispy Dory	120	3.36%	Low	28,000	45,000	17,000	High	Puzzle
12 Iga Babi penyey	54	1.51%	Low	40,000	50,000	10,000	Low	Dog
13 French Fries	130	3.64%	Low	8,000	20,000	12,000	Low	Dog
14 Toasted Bread	93	2.61%	Low	5,000	12,000	7,000	Low	Dog
15 Krupuk	123	3.45%	Low	1,000	2,000	1,000	Low	Dog
16 Strips nugget	150	4.20%	High	20,000	28,000	8,000	Low	Plowhorse
17 Soto ayam	423	11.86%	High	18,900	27,000	8,100	Low	Plowhorse
18 Bakut Sayur Asin	110	3.08%	Low	20,000	40,000	20,000	High	Puzzle
19 Pork Geprek	71	1.99%	Low	25,000	45,000	20,000	High	Puzzle
20 Ayam Geprek	65	1.82%	Low	30,000	40,000	10,000	Low	Dog
21 Nasi goreng	130	3.64%	Low	20,000	40,000	20,000	High	Puzzle

Menu Item Name	Number Sold	Popularity %	Popularity Category	Item Food Cost	Item Sell Price	Item Profit (E-D)	Profit Category	Menu Item Class
Beverage								
1 Tea	510	29.1%	High	3,000	9,000	6,000	Low	Plowhorse
2 Lemon Tea	76	4.3%	Low	8,000	20,000	12,000	High	Puzzle
3 Mango Tea	22	1.3%	Low	10,000	20,000	10,000	Low	Dog
4 Lychee tea	42	2.4%	Low	8,000	25,000	17,000	High	Puzzle
5 Orange	50	2.9%	Low	13,000	30,000	17,000	High	Puzzle
6 Juice	78	4.5%	Low	13,000	30,000	17,000	High	Puzzle
7 Mocha	27	1.5%	Low	20,000	35,000	15,000	High	Puzzle
8 Bir Bintang	333	19.0%	High	30,000	45,000	15,000	High	Star
9 Guinness	106	6.1%	High	32,000	40,000	8,000	Low	Plowhorse
10 Bali Hsi	94	5.4%	Low	20,000	35,000	15,000	High	Puzzle
11 Healthy DrinkCan	62	3.5%	Low	10,000	20,000	10,000	Low	Dog
12 Cappucino	133	7.6%	High	12,000	20,000	8,000	Low	Plowhorse
13 Coffee Lattee	72	4.1%	Low	7,000	20,000	13,000	High	Puzzle
14 Ekspresso	147	8.4%	High	5,000	20,000	15,000	High	Star

As Aglio Olio's calculation, the other menu has the same treatment. The result mentioned that we have five menus classified as Star, ten menus classified as Plow horse, 13 menus classified as Puzzle, and seven menus classified as Dog.

Information System for Menu Engineering

The process of calculating and determining the menu's category is mentioned in the flowchart, as in Figure 2 below. This logic is inputted into an information system.

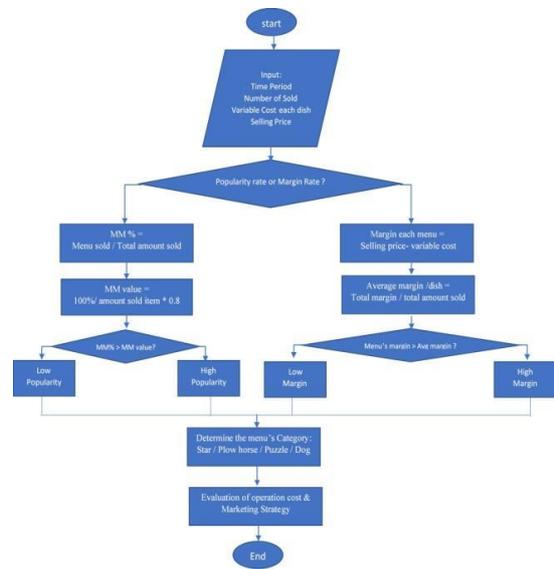


Figure 2 Flowchart of Information system's logic

We make the system for the owner of a restaurant by the flowchart in Figure 2. Thus the system is made to suit the design of already created and approved systems. Then the final step is the application of the system design that has been made. To apply this system, the owner needs input and output interface. The following step will be the interface for the owner.

2.2.1 LOGIN PROCESS

In this module, the owner logs in using the username and password that was created.

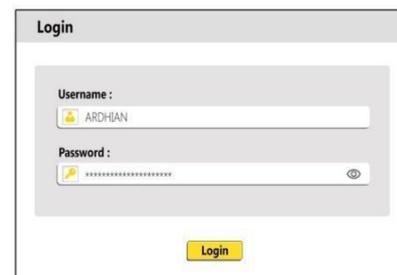


Figure 3 Interface of Login Process

After the user login, user can choose one process that he wants to input



Figure 4 Interface of the Choosing process

2.2.2 EXPENSE INPUT

In this module, the cost data input process will be carried out, both foodstuffs, overhead, employee salaries, and others.

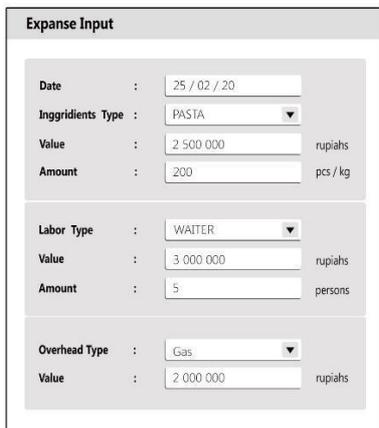
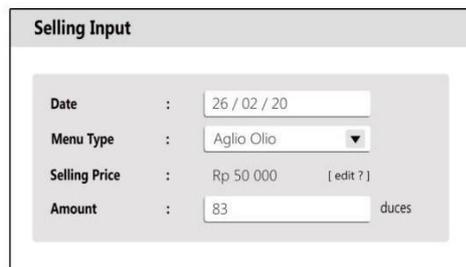


Figure 5 Interface of the Expense input process

2.2.3 SELLING INPUT

In this module, we will input food sales data for each



period, both in number and variety.

Figure 6 Interface of the Selling Input process

2.2.4 THE CATEGORIZING RESULT

In this module, the process of identifying the level of popularity and profitability of each period will be carried out.

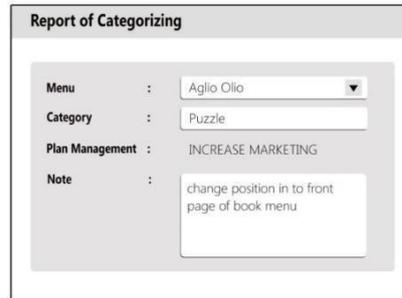


Figure 7 Interface of Result Process

3. CONCLUSION

The conclusion of the results obtained from the calculation of popularity rate and margin rate, there are five menus classified as Star, ten menus classified as Plow horse, 13 menus classified as Puzzle and seven menus classified as Dog.

With the analysis of these menus, we can suggest that the start menu can be kept for its performance was good. But the plowhorse menu needs to be more efficient in operational, so the margin will be bigger. On the other hand, the puzzle menus should have a better marketing strategy. And the dog menu should be replaced by another menu since it has little margin and the customer seldom buy it.

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