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Menu Profitability Optimization Strategy Using Menu Engineering at Cafe Cali Jakarta

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Abstract

Cafe Cali Jakarta is a luxury rooftop bar operating under The Orient Jakarta in the premium Sudirman district of Central Jakarta; therefore, strategic menu portfolio management is essential for sustaining profitability amid high operational overhead and increasingly competitive rooftop venue dynamics. This study aims to analyze the popularity performance and contribution margin of each menu item, classify the items within the Menu Engineering matrix, and formulate data-driven menu optimization strategies. This study employed a descriptive quantitative approach supported by qualitative analysis. Sales data from January to October 2025, covering 36 active menu items across eight categories, were analyzed using the Menu Engineering method developed by Kasavana and Smith (1982). Qualitative data were collected through in-depth interviews with Dian Nugraha Firdaus as the key informant, Rangga Oktafidiawan as the main informant, and Evelina Kusumawardhani as an additional informant, supported by field observation for data triangulation. The findings indicate that, of the 36 menu items analyzed, 12 items (33.3%) were classified as Stars, 13 items (36.1%) as Plow Horses, seven items (19.4%) as Puzzles, and four items (11.1%) as Dogs. The Stars quadrant contributed 43.5%

of the total portfolio contribution margin, indicating its central role in supporting menu profitability. Based on this classification, the recommended strategies include maintaining the quality of Stars while applying incremental price increases, improving Plow Horses margins through bundling and gradual repricing, increasing Puzzles visibility through structured suggestive selling and social media campaigns, and conducting contextual per-item evaluations for Dogs using a substitution-first approach. This study concludes that Menu Engineering provides a practical analytical basis for optimizing menu profitability and strategic decision-making in premium food and beverage venues. Its contribution lies in integrating quantitative menu performance analysis with qualitative managerial insights to support evidence-based menu optimization in a competitive rooftop bar context.

Keywords: Menu Engineering; Contribution Margin; Menu Optimization Strategy; Cafe Cali Jakarta; Food and Beverage Management

INTRODUCTION

The culinary industry, particularly cafés and restaurants in Jakarta, has experienced rapid growth and has become one of the primary drivers of the regional economy. This is evidenced by the accommodation and food service sector, which contributed approximately 4.95%–5.00% to the Gross Regional Domestic Product (GRDP) of the Special Capital Region of Jakarta (Badan Pusat Statistik, 2025). More specifically, the vitality of this sector is reflected in its substantial contribution to Regional Original Revenue (PAD) through the Specific Goods and Services Tax (PBJT) on Food and/or Beverages.

According to tax revenue realization data for DKI Jakarta, the Food and/or Beverage category generated a significant contribution of IDR 2.6 trillion (Rachman, 2025). The magnitude of this tax revenue not only indicates the high transaction volume within the restaurant and café business but also highlights the strategic role of the food and beverage (F&B) industry in supporting the economic stability of the capital city. This underscores that the operational sustainability and profitability of business entities in this sector, including Cafe Cali Jakarta, play a role that extends beyond the micro-operational level and contribute to broader regional economic growth.

The limited availability of natural resources in urban areas has encouraged the development of urban tourism centered on man-made attractions, where skyscrapers serve as prominent visual elements that offer distinctive appeal (Romero-García et al., 2019;

Nilsson, 2020). The architectural aesthetics of these high-rise buildings have evolved beyond their conventional functions and have increasingly become tourism assets, particularly through the utilization of rooftop spaces located on the uppermost floors. These rooftop areas have emerged as elevated tourism destinations that provide unique recreational experiences and panoramic city views (Vardopoulos et al., 2023; Larini & Suryawan, 2019).

The rapid urban development of Jakarta has stimulated the emergence of culinary destinations that offer added value through unique experiences and distinctive atmospheres. Rooftop bars and cafés, characterized by panoramic city skyline views as their primary attraction, have become increasingly popular among urban residents as venues for relaxation and social interaction (Ambrose, 2025). This phenomenon presents both opportunities and challenges for food and beverage (F&B) businesses, particularly in maintaining profitability amid the high operational costs that are inherent to the rooftop café business model.

According to (Ramadhani & Asnur 2021), many restaurants become trapped in operational inefficiencies. Common issues include excessively extensive menus that increase inventory and kitchen burdens, a lack of understanding regarding the actual profit contribution of individual menu items, the inability to distinguish high-performing products from those that generate financial losses, and pricing strategies that are not supported by comprehensive cost analysis and consumer psychology considerations. Consequently, profitability remains suboptimal, hidden margin losses occur, and overall business sustainability is weakened.

Therefore, to survive and grow within the highly competitive business environment of Central Jakarta, particularly in the Sudirman area, a data-driven management approach is essential. The increasing market demand also creates micro-level challenges for Cafe Cali Jakarta, especially in optimizing its menu to enhance contribution margins while remaining competitive. One strategic tool that has been widely recognized and proven effective globally is Menu Engineering.

According to Kasavana and Smith (1982, as cited in the American Hotel & Lodging Educational Institute, 2025), Menu Engineering is a management strategy that focuses on menu profitability and popularity to maximize profit per customer. The relevance of this data-driven approach has been reinforced by recent research conducted by (Kumar & Singh, 2026). which highlights that modern food and beverage (F&B) operations are increasingly integrating technology to enhance menu planning efficiency and cost control. The

application of scientific analysis has become essential in minimizing operational inefficiencies and improving forecasting accuracy, issues that frequently arise when relying on conventional manual methods. Consequently, Menu Engineering is no longer viewed solely from a culinary perspective but rather as a strategic profit center that must be managed systematically and scientifically to achieve operational excellence.

Within this framework (Dittmer et al., 2014) emphasized that restaurant profitability is determined not merely by sales volume but by the contribution margin generated from each menu item sold, defined as the difference between the selling price and food cost. However, in the contemporary era of sustainability-oriented management, the concept of contribution margin proposed by Dittmer can no longer be considered in isolation. (Bendesa et al., 2022), through their study on Sustainable Menu Engineering, argued that high profit margins should be aligned with efficient raw material utilization to reduce food waste. Supporting this view, (Atmaja et al., 2023) found that the failure to prioritize raw material procurement based on Menu Engineering analysis often results in excessive inventory accumulation, which eventually turns into waste and erodes the contribution margins that were initially targeted. Therefore, modern menu management extends beyond driving sales volume; it also serves as an operational control strategy aimed at ensuring that every ingredient generates maximum economic value while minimizing unnecessary waste.

Beyond its numerical and financial dimensions, Bendesa and Pavesic described the menu as the restaurant's most important internal sales tool. Without proper management, a menu merely functions as a price list rather than a strategic marketing instrument. This perspective is further supported by (Sutherland et al., 2020), who demonstrated that the effectiveness of a menu as a sales tool increasingly depends on the psychological principles of visual design. Their findings indicate that strategic menu item placement and layout significantly influence customer choices, directing attention toward highly profitable menu items. Menu Engineering integrates analyses of both popularity (sales performance) and profitability (contribution margin) to classify menu items into four categories: Stars, Plow Horses, Puzzles, and Dogs. This classification subsequently provides a foundation for strategic decision-making, including promotional activities, menu repositioning, product reformulation, price adjustments, and the elimination of underperforming menu items.

As part of The Orient Jakarta, a premium hospitality establishment located in the prestigious Sudirman district, Cafe Cali Jakarta bears exceptionally high operational overhead

costs, including rental expenses, utilities, and labor costs. This condition creates substantial financial pressure, requiring every menu item particularly food offerings to generate a healthy contribution margin in order to effectively cover fixed costs and support overall profitability. The critical issue lies in the absence of a comprehensive analysis to determine whether the current menu structure has been strategically designed to maximize profitability or whether numerous menu items merely serve as complementary elements that enhance customer experience and entertainment value while contributing minimally, or even negatively, to the coverage of operational overhead costs (Modhe et al., 2024).

The absence of an integrated food waste recording system at Cafe Cali Jakarta has created a significant blind spot in identifying hidden cost leakages. According to management information, the lack of administratively documented food waste data complicates the synchronization between sales figures and raw material efficiency. This situation increases the risk of financial losses resulting from excess inventory associated with low-demand menu items, which are difficult to mitigate accurately without reliable supporting data (Bendesa et al., 2022; Marliani et al., 2025).

To ensure business sustainability and improve financial performance, Cafe Cali Jakarta needs to conduct a comprehensive evaluation of its current menu structure. Although Menu Engineering is fundamentally data-driven, understanding the underlying reasons behind consumer choices and the rationale guiding management's pricing policies requires an in-depth qualitative analysis. Such an approach is essential for uncovering the strategic considerations behind the resulting menu classifications. This assertion is based on a preliminary study conducted through the observation of publicly available documents, including Cafe Cali Jakarta's menu offerings and pricing strategies. The findings indicate a potential imbalance between menu items designed primarily to deliver experiential value and those intended to generate profit. According to (Suwandy & Facrureza, 2023), in businesses characterized by high fixed costs, a thorough analysis of the sales mix is crucial, as menu items that appear popular may not necessarily generate sufficient contribution margins to cover operational expenses.

The qualitative approach employed in this study aims to explore strategic dimensions that cannot be fully captured through quantitative figures alone. Without Menu Engineering analysis, management may face difficulties in identifying menu items that are highly popular but generate low profit margins (Plow Horses), as well as those that are highly profitable yet

insufficiently promoted (Puzzles). Therefore, this study is expected to provide a deeper understanding of menu performance and generate context-specific recommendations for Cafe Cali Jakarta.

These economic conditions require food and beverage businesses such as Cafe Cali Jakarta to strategically implement Menu Engineering practices by maximizing profitability per customer through the analysis of menu popularity and contribution margins. Such efforts are essential not only for sustaining business operations but also for achieving a competitive advantage within Jakarta's rapidly growing food and beverage (F&B) industry. The following photographs were taken by the researcher during direct field observations conducted at the research site.

Figure 1. Rooftop View at Cali Café, Jakarta
Source: Author's Documentation (2026)

Based on figure 1 rooftop view at cali café, jakarta preliminary observations, Cafe Cali Jakarta presents an Urban Escape concept that combines the aesthetics of a tropical beach club with panoramic views of the skyscraper skyline in Central Jakarta. Visually, the use of wooden furniture, tropical plant accents, and an open rooftop area creates an exclusive yet relaxing atmosphere, which serves as a major attraction for urban consumers. However, this strong visual appeal must be supported by stable sales performance to ensure optimal business operations. To identify which product categories contribute most significantly to overall revenue generation, the sales mix data are presented in Table 1. below.

Table 1. Sales Data of Food Menu Items at Cafe Cali Jakarta
Period: January 2025 – October 2025

No.	Food Category	Menu Item	Portions Sold
Fresh & Raw			
1	Fresh & Raw	Salmon Poke Bowl	840

No.	Food Category	Menu Item	Portions Sold
2	Fresh & Raw	Caesar Salad	503
3	Fresh & Raw	Vietnamese Spring Rolls	562
Light Bites			
1	Light Bites	Cali Platter	265
2	Light Bites	Nachos	918
3	Light Bites	Chicken Wings Woku	590
4	Light Bites	Sate Ayam	681
5	Light Bites	Dragon Cakwe	546
6	Light Bites	Bakwan Sambal Matah	325
7	Light Bites	Chicken Skin	556
Tacos			
1	Tacos	Baja Fish Taco	577
2	Tacos	Carne Asada	563
Between Breads			
1	Between Breads	Kebab Rendang	401
2	Between Breads	Cali Burger	756
Indonesian			
1	Indonesian	Nasi Goreng Cali	2,297
2	Indonesian	Sop Buntut	495
3	Indonesian	Mie Ayam	495
Josper			
1	Josper	Octopus	275
2	Josper	Barramundi	257
3	Josper	Wagyu Striploin MB5+	257
4	Josper	Wagyu Rib Eye MB5+	213
5	Josper	Aus Wagyu Tomahawk	5
6	Josper	Cauliflower Steak	63
Sides			
1	Sides	Truffle Mash Potato	283
2	Sides	Josper Grilled Veggies	115
3	Sides	Triple Cooked Cali Fries	1,280
Pizza & Pasta			
1	Pizza & Pasta	Margherita	1,159
2	Pizza & Pasta	The Orient	1,469
3	Pizza & Pasta	Bianca	723

No.	Food Category	Menu Item	Portions Sold
4	Pizza & Pasta	Four Cheese	787
5	Pizza & Pasta	Fettuccine Carbonara	1,125
Sweet			
1	Sweet	Lava Cake	797
2	Sweet	Pisang Goreng	347
3	Sweet	Cheese Cake	626
4	Sweet	Fruit Platter	462
5	Sweet	Home-Made Ice Creams	455
Total		Total Portions Sold	22,068

Source: Compiled by the Researcher (2026).

Based on table 1 sales data of food menu items at cafe cali jakarta, there is a significant variation in sales volume among menu items, a condition that constitutes the fundamental basis of the Menu Engineering theory proposed by Donald I. Kasavana and David I. Smith (1982). From the researcher's perspective, the data, which have been specifically segregated and tailored to Cafe Cali Jakarta, are highly valuable as they accurately reflect actual consumer preferences and purchasing behavior. These findings provide an initial indication that not all menu items contribute equally to revenue generation, and that certain items may represent operational burdens (Dogs), while others may possess untapped profit potential (Puzzles).

The data will be further analyzed in conjunction with selling price and food cost information to calculate the contribution margin of each menu item. This procedure is consistent with the Menu Engineering framework, in which menu items are classified into four categories—Stars, Plow Horses, Puzzles, and Dogs based on the combined assessment of popularity (derived from sales volume data) and profitability (measured through contribution margin).

In light of the foregoing discussion, the study entitled "Menu Profitability Optimization Strategy Using Menu Engineering at Cafe Cali Jakarta" is both relevant and timely. This research is expected to provide a clear strategic roadmap for the management of Cafe Cali Jakarta in making informed menu-related decisions. Ultimately, it aims to support the restaurant in maintaining competitiveness within the highly dynamic Sudirman business district while achieving optimal and sustainable profitability.

Based on the research problems that have been formulated, the objectives of this study are as follows To classify menu items into the four quadrants of the Menu Engineering matrix (Stars, Plow Horses, Puzzles, and Dogs) at Cafe Cali Jakarta and To formulate menu

optimization strategies for the management of Cafe Cali Jakarta based on the results of the Menu Engineering matrix analysis.

METHODS

This study employed a descriptive quantitative approach with a case study design conducted at Cafe Cali Jakarta over the period January to October 2025. The study aimed to classify menu items into Menu Engineering quadrants and formulate menu optimization strategies based on their levels of popularity and profitability (Sari et al., 2022). Research participants were selected using purposive sampling, involving the Assistant Restaurant Manager and the Executive Sous Chef as key informants due to their authority and understanding of menu management (Rusmalinda et al., 2023). The research data consisted of primary data obtained through in-depth interviews and direct observation, as well as secondary data in the form of sales reports (sales mix), food cost data, menu lists, and operational documents of Cafe Cali Jakarta. The research instruments included interview guidelines, observation sheets, and documentation formats for sales data and raw material cost records (Haifa et al., 2025). Data collection techniques were conducted through documentation study, semi-structured interviews, and non-participant observation (Utami et al., 2025). Data analysis was performed using the Menu Engineering method by calculating Contribution Margin (CM), Average Contribution Margin (ACM), and Menu Mix Percentage (MM%) to classify each menu item into Stars, Plow Horses, Puzzles, and Dogs categories. The quantitative analysis results were further deepened through qualitative analysis and data triangulation to develop menu optimization strategy recommendations aligned with the operational conditions and business objectives of Cafe Cali Jakarta.

RESULTS

The Menu Engineering matrix classification obtained is not merely an administrative categorization; rather, it reflects the operational dynamics and strategic decisions that have evolved at Cafe Cali Jakarta. The following analysis provides an in-depth interpretation of the patterns emerging within each quadrant by linking the quantitative findings to the specific context of Cafe Cali as a luxury rooftop café with high overhead costs located in the premium Sudirman district of Central Jakarta, consistent with the contextual approach recommended in Menu Engineering analysis.

Stars Quadrant: Signature Menu Items Driving Profitability and Sales Volume

1. Quantitative Analysis

The Stars quadrant at Cafe Cali Jakarta consists of 12 menu items (33.3% of the total portfolio) that simultaneously exceed both the popularity threshold and the Average Contribution Margin (ACM) within their respective categories. These items are distributed across seven categories: *The Orient Pizza* and *Fettuccine Carbonara* from Pizza & Pasta; *Nachos* and *Chicken Wings Woku* from Light Bites; *Wagyu Striploin MB5+* and *Wagyu Rib Eye MB5+* from Josper; *Cali Burger* from Between Breads; *Salmon Poke Bowl* and *Caesar Salad* from Fresh & Raw; *Baja Fish Taco* from the Tacos category; and *Lava Cake* and *Cheese Cake* from the Sweet category.

From a profitability perspective, both Wagyu variants recorded the highest absolute contribution margins (IDR 555,000 and IDR 565,135 per portion, respectively). In terms of sales volume, *Nachos* emerged as the best-selling Stars item, with 918 portions sold over the ten-month period. The combination of high contribution margins and strong sales volumes positions the Stars quadrant as the primary contributor to Cafe Cali Jakarta's overall profitability, accounting for 43.5% of the restaurant's total contribution margin.

2. Interview Findings

From a managerial perspective, Mr. Dian Nugraha Firdaus confirmed that the alignment between the Stars menu items and Cafe Cali's positioning as a casual sharing and lifestyle dining destination constitutes the primary factor underpinning the success of this quadrant. The strategic placement of these menu items in prominent positions within the menu, together with active upselling by service staff, has also contributed to maintaining consistently high sales volumes.

This finding is reinforced by the operational perspective of Chef Rangga Oktafidiawan, who emphasized that recipe standardization ensures identical product quality regardless of who prepares the dishes, a commitment that directly strengthens guest trust and loyalty. According to the chef, this consistency has been intentionally established and rigorously maintained without compromising quality for the sake of cost efficiency.

Field observations further corroborated these findings. The researcher observed that Stars items such as pizzas and burgers frequently received spontaneous orders from guests

without requiring recommendations from service staff, indicating that these products have already established strong familiarity and inherent appeal in customers' perceptions.

3. Conclusion of the Stars Quadrant

The success of the Stars items is founded upon two mutually reinforcing pillars: kitchen standardization that guarantees consistency in taste and quality, and menu concepts that closely align with the venue's identity as a casual rooftop sharing bar. Consistency fosters customer trust, trust encourages repeat purchases, and sustained sales volumes validate the strategic position of the Stars quadrant. With price points ranging from mid-range to premium, the Stars menu serves as the financial backbone of Cafe Cali Jakarta by generating sufficient profitability to offset its substantial overhead costs.

Plow Horses Quadrant: Popular Yet Less Profitable

1. Quantitative Analysis

The Plow Horses quadrant represents the largest segment of Cafe Cali Jakarta's menu portfolio, comprising 13 menu items (36.1% of the total portfolio). These items exceed the popularity threshold within their respective categories but generate contribution margins below their category average.

The most notable example is *Nasi Goreng Cali*, the best-selling item across the entire menu, with 2,297 portions sold. Although it generates a contribution margin of IDR 114,466 per portion, this figure remains below the Indonesian category average contribution margin of IDR 122,364. Similar patterns are observed for *Baja Fish Taco* and *Carne Asada* in the Tacos category, as well as *Triple Cooked Cali Fries*, which dominates the Josper Sides category with a menu mix of 76.28% while still generating a contribution margin below the category average.

These findings indicate that although Plow Horses serve as key drivers of sales volume, they have yet to achieve optimal profitability. The relatively narrow gap between the actual contribution margins and the category average for several items suggests opportunities for strategic intervention without requiring substantial modifications to production formulas.

2. Interview Findings

From a managerial perspective, Mr. Dian Nugraha Firdaus identified three realistic approaches to improving the profitability of Plow Horses items: gradual price adjustments (small incremental increases), greater efficiency in raw material procurement, and bundling

or promotional strategies designed to increase average customer spending. He emphasized that price increases should be implemented incrementally while carefully monitoring customer responses to ensure that perceived value remains consistent.

These findings are reinforced by Chef Rangga Oktafidiawan, who stated that there is virtually no room for further production cost reductions for items such as *Nasi Goreng Cali*, whose food cost is already below 25%. He further emphasized that recipe standardization and raw material storage systems cannot be compromised without negatively affecting product quality, which represents one of Cafe Cali's key competitive advantages.

Consequently, the focus of strategic improvement shifts away from production efficiency toward pricing strategies, consistent with the managerial approach proposed by Mr. Dian.

3. Conclusion of the Plow Horses Quadrant

Further production cost reductions for Plow Horses are not feasible without compromising product quality. Therefore, strategic efforts should focus on pricing strategies and enhancing customers' perceived value. Gradual price adjustments combined with bundling strategies represent the most realistic approach. Eliminating Plow Horses is not a viable option considering their critical role as traffic-generating menu items.

Puzzles Quadrant: Untapped Profit Potential

1. Quantitative Analysis

The Puzzles quadrant comprises seven menu items (19.4% of the total portfolio) that generate contribution margins above their respective category averages but fail to achieve sufficient sales volumes to exceed the popularity threshold.

The most significant finding concerns the *Aus Wagyu Tomahawk*. Despite generating a contribution margin of IDR 369,002 per portion and carrying a selling price of IDR 2,900,000, only five portions were sold over the ten-month observation period, making it the highest-potential profit item that most significantly underperformed in terms of sales volume. *Sop Buntut* exhibits a similar pattern, recording the highest contribution margin within the Indonesian category (IDR 203,738 per portion) while achieving a menu mix of only 15.06%, substantially below the required threshold of 23.33%.

These findings suggest that the limited sales performance of Puzzles items is not attributable to deficiencies in product quality or profitability, but rather to insufficient exposure and a lack of active promotional efforts.

2. Interview Findings

From a managerial perspective, Mr. Dian Nugraha Firdaus identified limited product visibility as the primary barrier to the low sales performance of Puzzles items. Guests are generally less familiar with these products, perceive their prices as relatively high, and receive limited promotional emphasis or active upselling from service staff. To address these issues, he proposed structured suggestive selling, chef's recommendations, enhanced social media exposure, and bundled packages specifically targeting corporate clients and group dining.

These findings are reinforced by Chef Rangga Oktafidiawan, who identified additional operational challenges arising from the mismatch between certain Puzzles items and Cafe Cali's dominant atmosphere, which emphasizes finger food and easy dining experiences. He also noted production time constraints during unpredictable walk-in customer surges. Furthermore, Chef Rangga explained that the *Aus Wagyu Tomahawk* is intentionally maintained as an identity item rather than a high-volume revenue generator, reflecting a strategic objective that extends beyond purely financial considerations.

Field observations further supported these findings. The researcher did not identify any visual indicators such as chef's recommendation labels or special menu highlights that actively directed guests toward these high-margin Puzzles items.

3. Conclusion of the Puzzles Quadrant

Each additional sale generated by Puzzles items contributes substantially greater profitability than sales of Plow Horses. Accordingly, the most effective strategic approaches include structured suggestive selling, improved visual positioning within the menu, and targeted social media promotional campaigns. For the *Aus Wagyu Tomahawk*, private dining packages and group celebration packages should be more aggressively developed for the corporate entertainment segment.

Dogs Quadrant: Operational Burden Requiring Evaluation

1. Quantitative Analysis

A total of four menu items (11.1%) were classified as Dogs: *Bakwan Sambal Matah*, *Kebab Rendang*, *Mie Ayam*, and *Cauliflower Steak*. These items generate contribution margins below their respective category averages while simultaneously recording popularity levels below the established thresholds.

Collectively, the Dogs quadrant contributed only 1,284 portions (4.4% of total sales volume) and IDR 111.3 million in contribution margin (4.3% of the restaurant's total contribution margin). Although their financial contribution is relatively small, these items still create tangible operational burdens through additional raw material storage requirements, kitchen workspace allocation, and staff preparation time that could otherwise be dedicated to higher-performing menu items.

2. Interview Findings

Chef Rangga confirmed that the underperformance of the Dogs items had already been recognized internally. He explained that *Bakwan Sambal Matah* had already been removed from the active menu, while *Mie Ayam* has recently shown signs of improvement. Meanwhile, *Cauliflower Steak* has been deliberately retained because it serves as the restaurant's only vegetarian option within its category.

From the managerial perspective, Mr. Dian emphasized that the preferred approach is menu substitution rather than outright elimination, thereby preserving menu diversity while maintaining alignment with Cafe Cali's overall concept.

3. Conclusion of the Dogs Quadrant

From a managerial standpoint, Mr. Dian Nugraha Firdaus reaffirmed that the strategy for Dogs items will emphasize substitution rather than simple elimination to ensure that menu diversity remains consistent with Cafe Cali's concept. This conclusion is supported by Chef Rangga's operational perspective, who confirmed that the underperformance of several Dogs items had already been identified internally. He further explained that *Bakwan Sambal Matah* has been removed from the active menu, *Mie Ayam* has recently demonstrated improving performance, and *Cauliflower Steak* continues to be retained because it fulfills the restaurant's sole vegetarian offering within its category.

Strategic Implications by Quadrant

Based on the quantitative findings, the in-depth interview findings discussed, and the specific quadrant analysis, the following strategic implications have been formulated for each quadrant of Menu Engineering at Cafe Cali Jakarta. These recommendations integrate the operational perspectives of Mr. Dian Nugraha Firdaus as the Primary Informant, Chef Rangga Oktafidiawan as the Primary Informant, and Ms. Evelina Kusumawardhani as the Additional Informant, thereby ensuring that the resulting strategies are based not only on quantitative evidence but also on the practical realities of Cafe Cali Jakarta.

Stars Quadrant Strategy: Sustain Performance, Enhance Value, and Expand Market Reach

The Stars quadrant comprises 12 menu items (33.3% of the total portfolio) that serve as the primary drivers of Cafe Cali Jakarta's profitability, contributing 43.5% of the restaurant's total contribution margin. Mr. Dian confirmed that this success stems from the strong alignment between the menu concept and Cafe Cali's positioning as a 360-degree rooftop bar offering casual sharing and lifestyle dining experiences, complemented by strategic menu placement and active margin-based upselling by service staff. Chef Rangga further emphasized that product quality and recipe consistency are never compromised, as the trust established with guests represents the restaurant's most valuable asset and should not be sacrificed for short-term cost efficiency. Based on these findings, the strategic direction for the Stars quadrant focuses on the following three pillars.

Table 2. Strategic Implications for the Stars Quadrant

Strategic Pillar	Implementation Guidelines	Concrete Actions Based on Quantitative Findings and Interview Results
1. Maintain Quality and Consistency	Do not modify recipes or production formulas without rigorous testing. Recipe standardization must continue to be implemented across all kitchen shifts and personnel.	Chef Rangga stated, "I standardized everything for this restaurant." Therefore, written Standard Operating Procedures (SOPs) should be implemented for every Stars menu item to ensure that product quality does not depend on individual chefs. For the Wagyu MB5+ menu items, maintain the specified marbling score standards and instruct service staff to actively upsell these products to group dining guests.
2. Optimize Menu Placement and Visibility	Position Stars menu items in the highest eye-tracking areas of the menu (upper-right corner and the first page). Highlight them with	Mr. Dian emphasized the importance of "placing menu items in strategic positions." This strategy should be applied to The Orient Pizza, Nachos, Cali Burger, and Salmon Poke Bowl. In addition, professional food photography should be

Strategic Pillar	Implementation Guidelines	Concrete Actions Based on Quantitative Findings and Interview Results
	visual indicators such as "Our Signature" or "Best Seller."	developed for all 12 Stars menu items to support social media marketing content.
3. Evaluate Selective Price Increases	Volume-driven Stars items with strong customer loyalty may be subject to gradual price increases of 5–10%. Premium margin-driven Stars items should focus on pairing strategies and active upselling.	Nachos (918 portions sold over ten months) and Salmon Poke Bowl are suitable candidates for gradual price increases of IDR 5,000–10,000. For Wagyu Striploin and Wagyu Rib Eye, encourage pairings with wine or premium side dishes, in line with Mr. Dian's recommendation to optimize revenue through margin-based upselling strategies.

Source: Compiled by the Researcher, 2026.

Plow Horses Quadrant Strategy: Optimizing Profit Margins Without Sacrificing Customer Traffic

The Plow Horses quadrant comprises 13 menu items (36.1% of the total portfolio) that serve as the primary drivers of customer traffic at Cafe Cali Jakarta. Mr. Dian emphasized that eliminating Plow Horses is not a viable option because these items function as traffic builders that keep the café consistently busy. He proposed a carefully measured small incremental price increase strategy, accompanied by bundling initiatives and greater efficiency in raw material procurement. Chef Rangga confirmed that there is virtually no opportunity to reduce production costs, as the food cost of Nasi Goreng Cali is already below 25%, while the standardized raw material system, including the use of frozen storage for certain ingredients, cannot be compromised without affecting product quality. Consequently, the strategic focus shifts entirely toward pricing decisions and enhancing customers' perceived value.

Table 3. Strategic Implications for the Plow Horses Quadrant

Strategic Pillar	Implementation Guidelines	Concrete Actions Based on Quantitative Findings and Interview Results
1. Incremental Re-pricing Based on Customer Response	Implement gradual price increases (IDR 5,000–10,000 per stage), monitor customer responses over a four-week period, and reassess pricing decisions based on guest feedback.	Mr. Dian stated, "Small increment increase... allows us to observe customers' responses." Priority should be given to Nasi Goreng Cali (2,297 portions sold) and other popular Light Bites items that demonstrate the strongest customer loyalty and relatively inelastic demand.
2. Improve Raw Material Procurement Efficiency	Renegotiate purchasing prices with suppliers for high-volume menu items. Evaluate larger procurement batches to obtain more favorable	Focus on Nasi Goreng Cali, Sate Ayam, and Carne Asada, which utilize high-volume raw materials. Chef Rangga explained that the frozen storage system has already been effectively implemented; therefore,

Strategic Pillar	Implementation Guidelines	Concrete Actions Based on Quantitative Findings and Interview Results
	purchasing prices without altering recipes or product specifications.	procurement optimization should concentrate on increasing order quantities for these ingredients to achieve better purchasing efficiency.
3. Bundling and Promotional Packages	Develop bundled packages combining Plow Horses menu items with beverages to increase average spending per table without directly increasing menu prices.	Mr. Dian emphasized that "bundling or promotional packages will increase average spending." For example, offer a package consisting of Sate Ayam + one signature mocktail for IDR 130,000 (compared to IDR 145,000 when purchased separately). Promote these bundled offers through the restaurant's digital QR-code menu to maximize customer penetration.

Source: Compiled by the Researcher, 2026.

Puzzles Quadrant Strategy: Unlocking Hidden Profit Potential Through Enhanced Visibility and Promotion

The Puzzles quadrant comprises seven menu items (19.4% of the total portfolio) whose contribution margins exceed the Average Contribution Margin (ACM) of their respective categories. Consequently, every additional sale of these items generates greater profitability than comparable increases in Plow Horses sales. Mr. Dian identified that the primary challenge is not product quality but rather product visibility: guests are generally unfamiliar with these menu items, perceive their prices as relatively high, and receive no structured upselling from service staff. Chef Rangga further highlighted the mismatch between the characteristics of certain menu items (heavy dishes served in a casual dining venue) and confirmed that the Aus Wagyu Tomahawk is intentionally maintained as an identity item rather than as a high-volume revenue generator. Field observations also revealed the absence of any visual Chef's Recommendation indicators within the menu book. Accordingly, the strategic focus for the Puzzles quadrant is organized around the following three strategic fronts.

Table 4. Strategic Implications for the Puzzles Quadrant

Strategic Pillar	Implementation Guidelines	Concrete Actions Based on Quantitative Findings and Interview Results
1. Structured Suggestive Selling	Develop a dedicated upselling Standard Operating Procedure (SOP) specifically for Puzzles menu items. Train service staff to recommend two to three Puzzles	Mr. Dian emphasized the importance of "suggestive selling by the staff." Therefore, develop a customized upselling script for each Puzzles menu item. Sop Buntut should be recommended to guests ordering from

Strategic Pillar	Implementation Guidelines	Concrete Actions Based on Quantitative Findings and Interview Results
	items while guests are making their menu selections, using the positioning of "our chef's hidden gems."	the Indonesian category, while Cheese Cake and Lava Cake should be suggested as dessert pairings following the main course.
2. Visual Repositioning in the Menu and Social Media	Relocate Puzzles items to more prominent positions within the menu book. Add visual labels such as "Chef's Recommendation" or "Hidden Gem." Develop rotating social media campaigns featuring Puzzles items.	Mr. Dian suggested implementing "Chef's Recommendation... increasing exposure through social media or promotional campaigns." The target should be to feature one Puzzles menu item each week on Cafe Cali's Instagram and TikTok platforms. For the Aus Wagyu Tomahawk, develop a dedicated campaign under the theme "Jakarta's Most Exclusive Steak" targeting the premium dining segment.
3. Exclusive Packages for Corporate and Group Segments	Develop private dining and group celebration packages featuring premium Puzzles menu items, particularly Aus Wagyu Tomahawk and Sop Buntut, targeting the corporate entertainment market.	Chef Rangga explained that the Tomahawk functions as an identity item rather than a volume seller. Mrs. Evelina highlighted market opportunities involving "gatherings, anniversaries, and product launch events." Accordingly, develop a "Celebration Table for 6+" package featuring the Aus Wagyu Tomahawk (IDR 2,900,000) together with other premium menu selections. Sop Buntut, with a contribution margin of IDR 203,738, should be positioned as a signature Chef's Table special.

Source: Compiled by the Researcher, 2026.

Dogs Quadrant Strategy: Item-by-Item Evaluation and Context-Based Decision Making

The Dogs quadrant comprises four menu items (11.1% of the total portfolio) that fall below both the popularity threshold and the Average Contribution Margin (ACM) of their respective categories. Mr. Dian emphasized that the preferred approach is substitution (replacement) rather than outright elimination in order to preserve menu diversity. Chef Rangga confirmed that Bakwan Sambal Matah has already been removed from the active menu, Mie Ayam has recently demonstrated signs of improvement, and Cauliflower Steak has been deliberately retained as the restaurant's only vegetarian menu option. Therefore, the evaluation of Dogs items cannot be conducted uniformly, as each menu item requires different contextual considerations.

Table 5. Strategic Implications for the Dogs Quadrant

Menu Item	Current Condition	Strategic Recommendation
Bakwan Sambal Matah	Already removed from the active menu (confirmed by Chef Rangga). Contribution margin of IDR 68,506, with very low sales volume.	No further action is required. Ensure that a replacement menu item better aligned with Cafe Cali's positioning has been prepared before the item is officially removed from the printed menu.
Kebab Rendang	A borderline Dog, with a deviation of only 0.34% below the popularity threshold. Generates a moderate contribution margin and still possesses recovery potential.	Monitor sales performance over the next two months before making a final decision. If no significant improvement is observed, replace the item with a menu offering that better reflects Cafe Cali's atmosphere, such as finger food or fusion light bites.
Mie Ayam	Has recently shown an improving sales trend (confirmed by Chef Rangga). However, its contribution margin remains below the category's Average Contribution Margin.	Postpone any elimination decision. Continue monitoring performance for at least one additional month. If the positive trend continues, consider repositioning the item into the Plow Horses quadrant during the next periodic Menu Engineering evaluation.
Cauliflower Steak	Retained as the restaurant's only vegetarian menu option (confirmed by both Chef Rangga and Mr. Dian).	Maintain the menu item while revitalizing its presentation and adding a more prominent "Vegetarian Option" label within the menu. As a medium-term strategy, introduce one to two additional vegetarian menu items that better align with Cafe Cali's casual dining concept as complementary alternatives.

Source: Compiled by the Researcher, 2026.

Important Considerations for Implementation

All of the strategic implications presented above constitute data-driven recommendations based on the January–October 2025 observation period, strengthened through interview triangulation. Their implementation should be continuously verified and adjusted to accommodate the dynamic nature of operational conditions, considering potential changes in consumer preferences and internal organizational policies beyond the study period. Mrs. Evelina emphasized the importance of continuous and comprehensive data collection to enable the findings of this study to become increasingly refined and to provide greater value for the future development of Cafe Cali Jakarta.

DISCUSSION

Based on the results of the Menu Engineering analysis conducted on the food menu at Cafe Cali Jakarta, each menu item was found to exhibit varying levels of popularity and profitability, leading to its classification into one of four quadrants: Stars, Plow Horses, Puzzles, and Dogs. These findings indicate that high sales volume does not necessarily correspond to high profitability, and vice versa. This condition is consistent with the Menu Engineering framework proposed by Kasavana and Smith, which emphasizes that menu performance should be evaluated using two primary dimensions: menu mix (popularity) and contribution margin (profitability). Menu items categorized as Stars demonstrated both high sales volume and high profitability, making them valuable flagship products that should be maintained and continuously supported. In contrast, Plow Horses achieved strong sales performance but generated relatively low profit margins, suggesting the need for strategies such as cost-efficiency improvements, portion adjustments, or pricing revisions. The Puzzles category consisted of menu items with high profitability but low customer demand, indicating potential issues related to promotion, menu placement, or product communication. Consequently, targeted promotional campaigns, menu repositioning, and enhanced menu descriptions are necessary to increase their attractiveness and visibility. Meanwhile, menu items classified as Dogs exhibited low performance in both popularity and profitability, requiring comprehensive evaluation to determine whether they should be retained, modified, or removed from the menu portfolio altogether.

The findings of this study are consistent with those reported by Veronika et al. (2024), Miranti et al. (2025), and Suryani et al. (2024), who concluded that the application of Menu Engineering is effective in identifying menu items that serve as primary profit generators as well as those that impose operational burdens on the business. Nevertheless, this study offers a distinctive contribution by integrating quantitative Menu Engineering analysis with qualitative insights obtained through in-depth interviews with management personnel and culinary professionals. This mixed analytical approach enables the formulation of more practical and context-specific recommendations that reflect the actual operational conditions of Cafe Cali Jakarta as a luxury rooftop café. Therefore, Menu Engineering should be viewed not merely as a profitability assessment tool but also as a strategic decision-making framework that supports sales performance enhancement, operational efficiency, and the long-term sustainability of the business.

This study provides both theoretical and practical implications for the advancement of food and beverage management literature, particularly regarding the application of Menu Engineering in the premium culinary sector. The findings demonstrate that integrating quantitative analysis, through the calculation of contribution margins and menu popularity, with qualitative analysis derived from managerial interviews produces more comprehensive and context-sensitive recommendations than a purely quantitative approach. These findings reinforce the relevance of Menu Engineering theory as a strategic tool for optimizing profitability while simultaneously preserving a business's unique identity and competitive positioning. From a practical perspective, the results offer valuable insights for the management of Cafe Cali Jakarta in making informed decisions related to pricing strategies, promotional activities, menu development, and the evaluation of menu sustainability based on the classification of menu items into Stars, Plow Horses, Puzzles, and Dogs. Consequently, the implementation of these recommendations may contribute to improved operational efficiency, enhanced profitability, and long-term business competitiveness.

Research limitations. First, the research was conducted within a single case study setting, namely Cafe Cali Jakarta, which limits the generalizability of the results to other food and beverage businesses with different operational characteristics and market conditions. Second, the analysis relied exclusively on sales and food cost data collected from January to October 2025, which may not fully capture long-term fluctuations in consumer preferences and sales performance. Third, the Menu Engineering analysis focused primarily on menu popularity and contribution margin, without incorporating external factors such as customer satisfaction, online reviews, market competition, and seasonal promotional influences that may affect menu performance. Therefore, future studies are encouraged to expand the scope of investigation by involving multiple business settings, extending the observation period, and integrating consumer behavior and digital marketing variables to provide a more comprehensive understanding of menu profitability optimization strategies.

CONCLUSION

This study aimed to evaluate menu performance, classify menu items using the Menu Engineering matrix, and formulate strategic recommendations to optimize menu profitability at Cafe Cali Jakarta. The analysis was based on sales data collected between January and October 2025, covering 36 active menu items across eight product categories, complemented

by in-depth interviews with three key informants. The findings revealed that 12 menu items (33.3%) were classified as *Stars*, 13 items (36.1%) as *Plow Horses*, 7 items (19.4%) as *Puzzles*, and 4 items (11.1%) as *Dogs*. The *Stars* category generated the highest contribution, accounting for 43.5% of the total contribution margin, whereas *Plow Horses* demonstrated high sales volume but relatively low profitability. *Puzzles* exhibited substantial profit potential but remained underutilized due to limited visibility and promotional support. Meanwhile, *Dogs* contributed only 4.3% of the overall contribution margin, indicating the need for gradual evaluation while considering their non-financial strategic value. Based on these findings, several managerial strategies are proposed. For *Stars*, maintaining product quality and consistency, enhancing menu visibility, and implementing incremental price adjustments are recommended. For *Plow Horses*, the study suggests improving procurement efficiency, applying modest price increases, and introducing menu bundling strategies. *Puzzles* should be supported through structured suggestive selling, enhanced menu positioning, targeted social media campaigns, and the development of corporate dining packages. For *Dogs*, selective evaluation, menu substitution, and presentation revitalization are recommended rather than immediate elimination. Overall, the findings demonstrate that Menu Engineering provides a systematic and practical decision-making framework for improving menu portfolio profitability while preserving Cafe Cali Jakarta's positioning as a luxury rooftop dining destination in the premium Sudirman district of Central Jakarta.

This study contributes to the advancement of knowledge in hospitality management and food and beverage business studies, particularly in the application of the Menu Engineering approach within premium luxury rooftop dining establishments. The study not only classifies menu items based on their popularity and profitability levels but also integrates quantitative analysis with managerial interviews, thereby generating more contextualized and practically applicable recommendations. The findings enrich the existing literature on menu profitability optimization strategies in the premium culinary industry and demonstrate that data-driven decision-making should be complemented by operational considerations and brand identity management.

For future research, it is recommended to expand the scope of investigation to restaurants, hotels, or cafés with different operational characteristics, employ longer observation periods, and integrate Menu Engineering with consumer behavior analysis, customer satisfaction assessment, or customer value approaches. Such efforts would provide

a more comprehensive understanding of strategies for enhancing profitability and strengthening the competitive advantage of culinary businesses.

REFERENCES

Ahadi, G. D., & Zain, N. N. L. E. (2023). The simulation study of normality test using Kolmogorov-Smirnov, Anderson-Darling, and Shapiro-Wilk. *EIGEN Mathematics Journal, 6*(1), 11–19. https://doi.org/10.29303/emj.v6i1.131

Ambrose, M. (2025, June 4). *Raising the bar: Why rooftop bars are skyrocketing in popularity*. In the Mix. https://inthemixbyimi.com/2025/06/why-rooftop-bars-are-skyrocketing-in-popularity

Atmaja, I. N. P. S., Pambudi, B., & Wardana, M. A. (2023). Analisis Strategi Pengembangan Bisnis Berbasis Menu Engineering dalam Upaya Meningkatkan Pendapatan Restoran. *Jurnal Ilmiah Pariwisata dan Bisnis, 2*(5), 1206–1224. https://doi.org/10.22334/paris.v2i5.428

Badan Pusat Statistik Provinsi DKI Jakarta. (2025, August 6). *Distribusi PDRB Provinsi DKI Jakarta Atas Dasar Harga Berlaku Menurut Lapangan Usaha Triwulanan (Persen), 2025*. https://jakarta.bps.go.id/id/statistics-table/2/MTA0OSMy/distribusi-pdrb-provinsi-dki-jakarta-atas-dasar-harga-berlaku-menurut-lapangan-usaha-triwulanan.html

Bendesa, A. O., Astuti, N. N. S., Astawa, I. K., Susanto, B., & Sarjana, I. M. B. (2022). Optimizing food costs through menu engineering, portion control, supplier negotiations, waste reduction, and technology integration. *Journal of Commerce, Management, and Tourism Studies, 1*(1), 1–13. https://doi.org/10.58881/jcmts.v1i1.3

Dittmer, P. R., Keefe, J. D., Hoyer, G., & Foster, T. (2014). *Principles of food, beverage, and labour cost controls* (2nd Canadian ed.). John Wiley & Sons.

Haifa, N. M., Nabilla, I., Rahmatika, V., Hidayatullah, R., & Harmonedi. (2025). Identifikasi Variabel Penelitian, Jenis Sumber Data dalam Penelitian Pendidikan. *Dinamika Pembelajaran: Jurnal Pendidikan dan Bahasa, 2*(2), 256–270. https://doi.org/10.62383/dilan.v2i2.1563

Kumar, S., & Singh, M. (2026). Role of artificial intelligence in menu planning, cost control, and food waste reduction in star category hotels: A study. *International Journal of Research in All Subject, 2*(1), 46–47. https://www.multiarticlejournal.com/archives/2026/vol2/issue1/2009

Larini, C., & Suryawan, I. B. (2019). Trend Rooftop Restaurant and Bar Sebagai Daya Tarik Wisata Kuliner di DKI Jakarta. *Jurnal Destinasi Pariwisata, 6*(2), 371. https://doi.org/10.24843/JDEPAR.2018.v06.i02.p27

Marliani, R., Priyatini, W., & Hindayani, P. (2025). *Strategi Mitigasi Pengelolaan Food Waste di Restoran "X" Kabupaten Bandung* [Undergraduate thesis, Universitas Pendidikan Indonesia]. https://repository.upi.edu/140876

Modhe, M. R., Rustiana, A. A., Sukma, A. M., Jaghung, M. D., & Saridawati. (2024). Analisis Kontribusi Margin dalam Optimalisasi Perencanaan Penjualan Produk pada PT Sumber Alfaria Trijaya Tbk. *Mufakat: Jurnal Ekonomi, Manajemen dan Akuntansi, 3*(1), 544–552. https://doi.org/10.572349/mufakat.v3i1.2341

Nilsson, J.-H. (2020). Conceptualizing and contextualizing overtourism: The dynamics of accelerating urban tourism. *International Journal of Tourism Cities, 6*(4), 657–671. https://doi.org/10.1108/IJTC-08-2019-0117

Rachman, A. (2025, August 28). *Pendapatan Pajak DKI Capai Rp54,1 T, dari PBB hingga Jasa Parkir*. CNBC Indonesia. https://www.cnbcindonesia.com/news/20250828152413-4-662234/pendapatan-pajak-dki-capai-rp541-t-dari-pbb-hingga-jasa-parkir

Ramadhani, A. F., & Asnur, L. (2021). Penerapan Menu Engineering dalam Penetapan Profitabilitas Menu A'la Carte. *Jurnal Penelitian dan Pengembangan Sains dan Humaniora, 5*(3), 488–500. https://doi.org/10.23887/jppsh.v5i3.34636

Romero-García, L. E., Aguilar-Gallegos, N., Morales-Matamoros, O., Badillo-Piña, I., & Tejeida-Padilla, R. (2019). Urban tourism: A systems approach–state of the art. *Tourism Review, 74*(3), 679–693. https://doi.org/10.1108/TR-06-2018-0085

Rusmalinda, R., Mawardah, K., & Rejeki, S. (2023). Pendampingan Teknik Purposive Sampling pada Mata Pelajaran Biologi di Madrasah Aliyah Darul Amal Metro Lampung. *Member: Jurnal Inovasi Pengabdian Masyarakat, 2*(3), 11–21. https://doi.org/10.47902/member.v2i3.285

Sari, M., Rachman, H., Astuti, N. J., Afgani, M. W., & Siroj, R. A. (2022). Explanatory Survey dalam Metode Penelitian Deskriptif Kuantitatif. *Jurnal Pendidikan Sains dan Komputer, 3*(1), 10–16. https://doi.org/10.47709/jpsk.v3i01.1953

Sutherland, I., Sim, Y., Lee, S. K., Byun, J., & Kiatkawsin, K. (2020). Topic modeling of online accommodation reviews via latent Dirichlet allocation. *Sustainability, 12*(5), Article 1821. https://doi.org/10.3390/su12051821

Suwandy, S., & Facrureza, D. (2023). Analisis Implementasi Menu Engineering dalam Upaya Meningkatkan Volume Penjualan pada Sally Bakery. *Jurnal Ilmiah Pariwisata, 28*(3), 330–344. https://doi.org/10.30647/jip.v28i3.1753

Utami, T. H., Sa'diyah, H., & Munawwarah, F. (2025). Qualitative data collection methods. *Demagogi: Journal of Social Sciences, Economics and Education, 3*(3), 133–142. https://doi.org/10.61166/demagogi.v3i3.79

Vardopoulos, I., Giannopoulos, K., Papaefthymiou, E., Temponera, E., Chatzithanasis, G., Goussia-Rizou, M., Karymbalis, E., Tsartas, P., & Sdrali, D. (2023). Urban buildings sustainable adaptive reuse into tourism accommodation establishments: A SOAR analysis. *Discover Sustainability, 4*, Article 50. https://doi.org/10.1007/s43621-023-00166-2