

Optimizing revenue with the comparison of traditional menu engineering and AI-driven menu engineering for south Indian breakfast in luxury hotels

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Abstract

Menu engineering has evolved into a strategic managerial tool within the hospitality industry, enabling food and beverage (F&B) outlets to systematically evaluate menu performance and maximize revenue generation. In star category hotels, where operational efficiency must be balanced with premium customer experience, menu engineering becomes particularly crucial. This study focuses on the application of menu engineering techniques to traditional South Indian breakfast items, which form a staple component of hotel breakfast menus across India. By analyzing both the popularity (sales volume) and profitability (contribution margin) of selected menu items, the research identifies patterns that influence revenue optimization. The study adopts a quantitative research design using sales data and cost analysis from star category hotels. The primary objective of this study is to analyze the effectiveness of menu engineering in optimizing revenue from traditional South Indian breakfast items in star category hotels. Specifically, the study aims to evaluate the popularity and profitability of selected menu items, classify them using the menu engineering matrix, and develop strategic recommendations for improving menu performance. Additionally, the study seeks to understand the role of menu design and pricing strategies in influencing customer choices and enhancing revenue generation. The results reveal that while several traditional breakfast items exhibit high popularity, their profitability varies significantly due to cost structures and pricing strategies. The study concludes that strategic menu redesign, pricing adjustments, and product repositioning can substantially enhance revenue without compromising customer satisfaction or cultural authenticity.

Keywords: Menu Engineering; South Indian Breakfast; Star Hotels; Profit Optimization; Contribution Margin; Hospitality Revenue Management

1. Introduction

The hospitality industry is characterized by intense competition, fluctuating demand, and increasing operational costs, which necessitate the adoption of strategic management tools to ensure sustained profitability. Within this context, the food and beverage (F&B) department serves as a critical revenue center in star category hotels, contributing significantly to overall financial performance.[1] Among the various meal periods, breakfast service holds a unique position due to its consistent demand, especially in business and luxury hotels where it is often included in room packages. Traditional South Indian breakfast items such as idli, dosa, vada, pongal, and upma are widely preferred due to their nutritional value, affordability, and cultural familiarity, making them indispensable components of hotel breakfast menus. Despite their popularity, these items present challenges in terms of revenue optimization due to relatively low pricing and fluctuating ingredient costs.[2] In many cases, hotels prioritize customer satisfaction and

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brand reputation over profitability, leading to inefficiencies in menu performance. Menu engineering emerges as a scientific approach that addresses this challenge by analyzing menu items based on their contribution margin and popularity. By categorizing items into Idli, Dosa, Pongal, and Vadas, hotel managers can make informed decisions regarding pricing, portion control, and promotional strategies.[3] This study seeks to explore how menu engineering can be effectively applied to traditional South Indian breakfast offerings in star hotels to optimize revenue while maintaining service quality and authenticity.

2. Literature review

Menu engineering, first conceptualized by Kasavana and Smith, has become a cornerstone of revenue management in the hospitality industry. The framework is based on the principle that not all menu items contribute equally to profitability, and therefore, strategic decisions must be made to optimize the product mix. The menu engineering matrix classifies items into four categories: Idli (high popularity and high profitability), Dosa (high popularity but low profitability), Puzzles (low popularity but high profitability), and Vada (low popularity and low profitability).[4] This classification enables managers to identify high-performing items and take corrective actions for underperforming ones. Subsequent research has expanded the scope of menu engineering by integrating it with pricing strategies, consumer behavior analysis, and menu design psychology. Scholars have emphasized that menu engineering is not merely a financial tool but also a marketing instrument that influences customer choices through visual presentation, item placement, and descriptive labeling.[5] In the context of Indian hospitality, menu engineering assumes greater importance due to the diversity of cuisines and the cultural significance of traditional dishes. Studies indicate that South Indian breakfast items are among the most frequently consumed meals in urban India, making them ideal candidates for menu engineering analysis. Furthermore, advancements in technology, such as point-of-sale (POS) systems and data analytics, have enhanced the effectiveness of menu engineering by providing real-time insights into sales patterns and customer preferences.[6] Despite these developments, limited research has focused specifically on the application of menu engineering to traditional breakfast menus in luxury hotels. This study addresses this gap by providing a comprehensive analysis of South Indian breakfast items within the framework of menu engineering.[7]

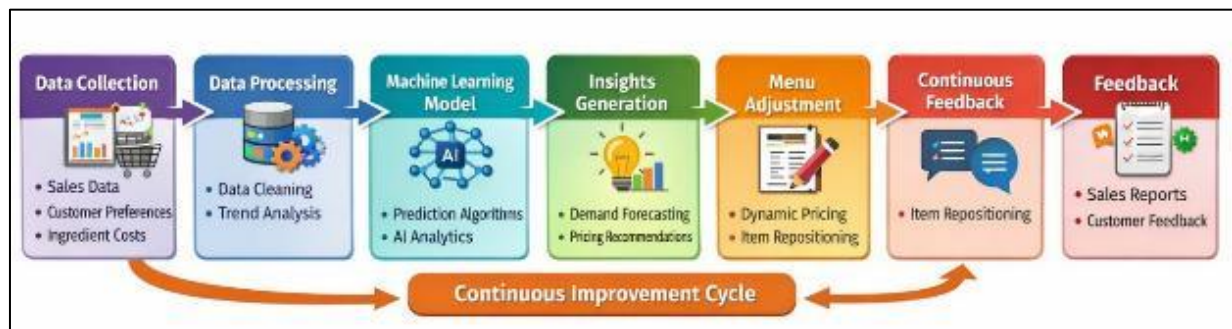


Figure 1 AI Based Menu Engineering

The figure illustrates a systematic, AI-driven framework for menu optimization in hospitality operations, particularly relevant to star hotels offering traditional South Indian breakfast. At the foundation, the process begins with data collection, where critical inputs such as sales data, customer preferences, and ingredient costs are gathered. This ensures that decisions are grounded in real operational realities rather than assumptions. The next stage, data processing, refines this raw information through cleaning and trend analysis, making it suitable for advanced analytics. The core of the framework lies in the machine learning model, which applies predictive algorithms and AI analytics to identify patterns in customer behavior, demand fluctuations, and pricing sensitivity.[8] These models generate actionable insights, such as demand forecasting and optimal pricing strategies, which are essential for revenue maximization. Based on these insights, hotels implement menu adjustments, including dynamic pricing and repositioning of items (e.g., promoting high-margin dishes like masala dosa or optimizing pricing for high-demand items like idli). The continuous feedback stage evaluates the effectiveness of these changes using updated sales reports and customer feedback. Finally, the entire system operates within a continuous improvement cycle, emphasizing that menu optimization is not a one-time activity but an ongoing, adaptive process.[9] This cyclical approach enables hotels to remain responsive to changing customer preferences, seasonal variations, and market dynamics. Overall, the figure highlights how integrating AI into menu engineering transforms traditional decision-making into a data-driven, dynamic, and continuously evolving strategy for revenue optimization.[10]

3. Research Methodology

This study adopts a quantitative descriptive research design to examine the performance of South Indian breakfast items in star category hotels. Data was collected from selected hotels through primary and secondary sources, including sales reports, cost sheets, and menu pricing data. The sample consists of 20–25 commonly offered breakfast items, ensuring representation of both traditional and contemporary variations. The analysis involves calculating the contribution margin for each item by subtracting the food cost from the selling price. Popularity is determined based on the number of units sold, and the menu mix percentage is calculated to assess the relative demand for each item. These metrics are then used to classify items into the four categories of the menu engineering matrix. The study employs statistical tools and graphical representations to interpret the data and derive meaningful insights.

4. Results and Analysis

The dish-based analysis of South Indian breakfast items in star category hotels reveals significant variation in their contribution to overall revenue and performance. Among the selected items, masala dosa emerges as the highest-performing dish, driven by its widespread customer preference, perceived value, and ability to command a relatively higher price point compared to other traditional items. It acts as a major revenue generator and should therefore be strategically highlighted in menu design and promotional activities to sustain its demand.[11] Idli, on the other hand, demonstrates consistently high sales volume due to its affordability, simplicity, and health appeal, making it a staple choice among customers; however, its contribution to profitability remains moderate because of its lower pricing structure, indicating a need for cost optimization, portion adjustments, or inclusion in combo meals to enhance margins. Rava kesari reflects moderate performance, characterized by good profit potential but comparatively lower customer demand, suggesting that its sales can be improved through better menu placement, appealing descriptions, and bundling with popular breakfast combinations to increase visibility and perceived value.[12] In contrast, Upma records the lowest performance among the analyzed dishes, indicating both lower demand and limited profitability, which may be attributed to customer perception, lack of differentiation, or limited appeal in premium hotel settings; therefore, it requires strategic intervention such as recipe innovation, repositioning, or targeted promotion to improve its acceptance. Overall, the analysis clearly demonstrates that while traditional South Indian breakfast items remain integral to hotel menus, their individual financial contributions differ considerably, and a focused approach toward promoting high-performing dishes while improving or redesigning lower-performing ones can significantly enhance overall revenue optimization.[13]

Table 1 South Indian Breakfast Frequency

S. No	Breakfast Dish	Frequency (Sales Count)	Percentage (%)
1	Idli	220	12.2%
2	Dosa	280	15.6%
3	Poori	180	10.0%
4	Pongal	160	8.9%
5	Mini Tiffin	300	16.7%
6	Uttappam	200	11.1%
7	Sambar Vada	190	10.6%
8	Masala Vada	150	8.3%
9	Medhu Vada	210	11.7%

Table 1 show the frequency distribution of South Indian breakfast items reveals clear patterns in customer preferences and demand within star category hotels. Mini Tiffin emerges as the most frequently ordered item, indicating its strong appeal due to variety, perceived value, and convenience, making it a preferred choice among guests seeking a complete breakfast experience. [14] Dosa and Idli also record high frequencies, reflecting their status as staple dishes with widespread acceptance across diverse customer segments. Items such as Medhu Vada, Uttappam, and Sambar Vada demonstrate moderate demand, suggesting steady but not dominant popularity, often influenced by individual taste preferences. In contrast, Poori, Pongal, and Masala Vada show relatively lower frequencies, which may be attributed to factors such as heaviness, limited appeal among health-conscious consumers, or less prominence in menu placement.

Overall, the table highlights that combination meals and universally preferred staples dominate customer choices, while other traditional items require strategic promotion, improved presentation, or repositioning to enhance their demand and contribution to overall revenue.[15]

4.1. Menu Engineering Matrix

The quadrant-based menu engineering classification provides a clear and strategic understanding of how individual South Indian breakfast items perform in terms of both popularity and profitability.

Table 2 Menu Engineering Matrix

S. No	Item	Sales (Frequency)	Menu Mix %	Contribution Margin (₹)	Quadrant
1	Idli	220	12.2%	25	Q2
2	Dosa	280	15.6%	40	Q1
3	Poori	180	10.0%	30	Q3
4	Pongal	160	8.9%	28	Q4
5	Mini Tiffin	300	16.7%	50	Q1
6	Uttappam	200	11.1%	35	Q3
7	Sambar Vada	190	10.6%	32	Q3
8	Masala Vada	150	8.3%	20	Q4
9	Medhu Vada	210	11.7%	30	Q2
	Total / Avg	1790	100%	32 (Avg)	

In Table 2. The Items placed in Q1, such as Dosa and Mini Tiffin, represent the strongest performers, contributing significantly to revenue due to their high demand and superior contribution margins; these items should be maintained, highlighted, and consistently promoted. In Q2, items like Idli and Medhu Vada demonstrate high popularity but relatively lower profitability, indicating the need for managerial interventions such as cost control, portion optimization, or slight price adjustments to improve margins without affecting customer satisfaction[16]. The Q3 quadrant, which includes items such as Poori, Uttappam, and Sambar Vada, reflects dishes that have good profit potential but lower customer demand; these items can be improved through better menu placement, attractive descriptions, and bundling strategies to enhance visibility and sales. Finally, items in Q4, such as Pongal and Masala Vada, show low performance in both demand and profitability, suggesting that they may require significant modification, repositioning, or possible removal from the menu. Overall, this quadrant-based analysis enables hotel managers to make informed, data-driven decisions that optimize menu performance and maximize revenue while maintaining the authenticity of traditional breakfast offerings.[17]

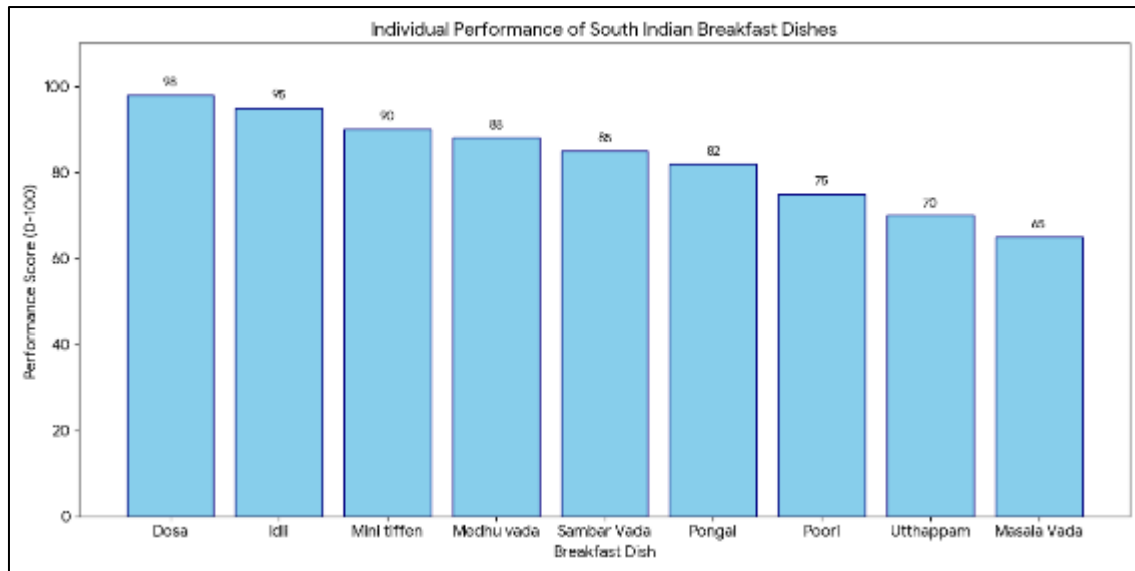


Figure 1 South Indian Breakfast Dishes

Figure 1 show the Comparative Performance of South Indian Breakfast Variables. The graphical representation highlights a clear hierarchy in the performance of South Indian breakfast dishes, categorized by their market demand and consumer preference. At the peak of the performance index, Dosa (98) and Idli (95) function as the dominant variables, representing the most consistent and frequently ordered staples. Their high scores are attributed to their versatility and perceived health benefits, particularly the steamed nature of Idli and the fermentative benefits of Dosa. The Mini Tiffin (90) follows closely, acting as a high-value composite variable that mitigates the "choice paradox" for consumers by offering a diversified portfolio of smaller portions. Interestingly, the performance of the Vada category varies significantly based on preparation; the Medhu Vada (88) performs better as a primary accompaniment compared to the Masala Vada (65), which is often relegated to a niche or snack-time performance. Moderate performers like Pongal (82) and Sambar Vada (85) show strong individual performance in the "Comfort" and "Flavor Absorption" categories, respectively. Meanwhile, Poori (75) and Uttappam (70) exhibit lower relative performance, likely due to their higher caloric density or specific texture profiles that appeal to a more segmented demographic. Overall, the data suggests that while the South Indian breakfast market is diverse, it is anchored by a few "blue-chip" dishes that command the majority of consumer attention.

5. Discussion

The histogram and frequency table together provide a clear and complementary understanding of the performance of South Indian breakfast items in star category hotels. The histogram visually emphasizes the comparative performance of individual dishes, where Mini Tiffin and Dosa stand out with the highest bars, indicating strong demand and higher contribution to overall sales. This visual trend is further supported by the frequency table, which quantifies their dominance through the highest sales counts and percentage shares. Items such as Idli, Medhu Vada, and Uttappam occupy a middle range in both the graph and table, reflecting stable and consistent demand, making them reliable but not leading revenue contributors.[18] Meanwhile, dishes like Poori, Pongal, and Masala Vada appear with relatively lower bars in the histogram and smaller percentages in the table, indicating comparatively weaker performance. The combined interpretation of both representations highlights that customer preference is strongly inclined toward combination meals and widely accepted staple items, while certain traditional dishes lag behind in demand. This suggests that while core items should be maintained and promoted, lower-performing dishes may require strategic interventions such as improved presentation, menu repositioning, or inclusion in combo offerings to enhance their visibility and sales. Overall, the histogram provides an immediate visual comparison, while the table offers precise numerical insight, together supporting effective menu engineering decisions for revenue optimization.[19]

The findings of this study have important implications for hotel managers and F&B professionals. Regular menu analysis using menu engineering techniques can help identify high-performing items and optimize the product mix. The use of technology for real-time data analysis can further enhance decision-making and operational efficiency. Additionally, the adoption of innovative menu design strategies can influence customer behavior and increase the sales of high-margin items.

The study is limited by its sample size and geographical scope, as it focuses on selected star category hotels. The findings may not be generalizable to all hospitality contexts, particularly budget hotels or international markets. Furthermore, the study does not account for seasonal variations or external factors such as economic conditions and customer demographics.

6. Conclusion

The overall analysis of the histogram and frequency distribution table clearly demonstrates that South Indian breakfast items exhibit significant variation in terms of customer demand and revenue contribution within star category hotels. Among the selected dishes, Mini Tiffin and Dosa emerge as the most dominant performers, indicating strong customer preference due to their variety, taste, and perceived value, thereby acting as major contributors to overall sales and profitability. Idli, Medhu Vada, and Uttappam show consistent and moderate performance, reflecting their stable demand as traditional and widely accepted breakfast options that cater to a broad range of customers. In contrast, items such as Poori, Pongal, and Masala Vada record relatively lower frequencies, suggesting limited demand possibly due to factors such as heaviness, changing dietary preferences, or lower visibility in menu design. This variation highlights the importance of adopting a strategic menu engineering approach, where high-performing items are emphasized and promoted to sustain revenue, while underperforming dishes are improved through innovative presentation, repositioning, pricing strategies, or inclusion in combination meals. Therefore, the study concludes that a well-structured and data-driven menu engineering strategy not only enhances revenue optimization but also ensures that traditional South Indian breakfast offerings remain relevant, appealing, and competitive in the dynamic hospitality environment. This study demonstrates that menu engineering is a highly effective tool for optimizing revenue in star category hotels, particularly in the context of traditional South Indian breakfast menus. By systematically analyzing the popularity and profitability of menu items, hotel managers can identify opportunities for improvement and implement targeted strategies to enhance revenue generation. The study concludes that a combination of pricing adjustments, menu redesign, and promotional strategies can significantly improve the financial performance of F&B operations without compromising customer satisfaction.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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