Promotional Strategy for Indonesian Street Food by using Market Basket Analysis case study: Seblak

Indri Sari Dewi[1*], Jimmy Tjen[2]
[1] Department of Digital Business, Faculty of Information Technology, Universitas Widya Dharma Pontianak, Pontianak, Indonesia.
[2] Department of Informatics, Faculty of Information Technology, Universitas Widya Dharma Pontianak, Pontianak, Indonesia.
*Email:
22430162@widyadharma.ac.id [1]
jimmy.tjen@mathmods.eu [2]

Abstract. This research seeks to optimize product bundling strategies for self-serve *seblak* dining experiences through the application of Market Basket Analysis (MBA) using the Apriori algorithm. This study aims to identify optimal combinations of ingredients that enhance customer satisfaction while maximizing sales performance. A dataset comprising 3,302 transaction records involving 17 unique *seblak* ingredients was analyzed. The Apriori Algorithm was employed to extract frequent itemsets and develop association rules based on predefined threshold for support, lift, and confidence. The analysis identified a combination of five key ingredients—*basreng,* chicken egg, fish cake, chicken sausage, and mustard green—as the most suitable bundle, achieving a support value of 3,4%, a lift of 1.0026, and a confidence level of 50,81%. This bundling strategy offers a well-balanced and appealing *seblak* bowl, simplifying customer choices and driving business profitability. The findings demonstrate the value of data-driven methods in optimizing product bundling within the culinary industry, emphasizing the potential of MBA to improve customer experience and operational effectiveness.

Keywords: Market Basket Analysis; Apriori Algorithm; Product Bundling; Indonesian Street Food; Culinary Data Analysis

Introduction

The buffet restaurant industry has seen remarkable growth in popularity, particularly in the western industrialized world, where competition among establishments has intensified (Wu, 2022). This highly competitive environment has led marketers and restaurant operators to concentrate on strategies that maintain or enhance their market share, particularly through improved service quality and effective market segmentation (Wu, 2022). Buffet concepts are evolving and adapting to various cuisines, including traditional local dishes, to cater to diverse consumer preferences (Zammit, 2022).

One innovative adaptation is the *Seblak Prasmanan*, a buffet-style service offering *seblak*, a well-loved Indonesian dish composed of chewy crackers, various protein toppings, vegetables, and flavorful spicy broth. This concept allows customers to customize their bowls, choosing ingredients and spice levels according to their preferences. The customizable nature of *seblak* aligns seamlessly with the buffet model, providing flexibility while appealing to a broad audience (Gittelman & Peters). However, to remain competitive, a deep understanding of customer preferences is essential, particularly in identifying the combinations of ingredients and toppings that are most popular (Talens & Santa Cruz, 2022).

Building on these insights, this study applies market basket analysis (MBA) using the Apriori algorithm to the *Seblak Prasmanan* model to identify combinations of toppings and ingredients that are most frequently chosen together by customers. The Apriori algorithm works by analyzing transaction data to uncover frequent itemset, combinations of items that meet a minimum threshold of support, and then generating association rules based on confidence levels to determine the strength of this relationships (Han & Jian, 2022). Its efficiency lies in systematically pruning irrelevant combinations, making it particularly effective for analyzing large datasets (Han & Jian, 2022). By leveraging data from 3,302 customer transactions, this study uncovers purchasing patterns to inform bundling strategies for *seblak* products, enabling the creation of single bowls with combinations of toppings that are either customer favorites or have high potential for joint sales.

Previous research by (Sari & Yulia, 2021) highlighting its potential for identifying patterns in transactional databases. (Anugrah, Widiharih, & Sugito, 2022) have expanded on this foundation, demonstrating its effectiveness in optimizing product bundling strategies. (Iskandar & Zulvia, 2024) employed the Apriori method on 5,673 transactions with a minimum support of 0.15 and minimum confidence of 0.5, yielding 5 rules for family products and 5 rules for product items as sales strategy recommendations, including 4 mixed bundling products. (Arinal & Rusmarhadi, 2024) utilized the algorithm to design promotional bundles, resulting in enhanced customer satisfaction and sales growth. These studies underscore the algorithm's versatility in addressing the challenges of dynamic consumer markets and its critical role in data-driven retail strategies. Despite its growing popularity, there is a lack of academic research exploring consumer behavior and market dynamics associated with *Seblak Prasmanan*. This study aims to fill this gap by analyzing purchasing patterns at a *Seblak Prasmanan* establishment. By employing market basket analysis, we seek to uncover associations among different food items and identify potential opportunities for menu optimization and targeted marketing. The outcomes of this research not only provide insights for improving customer satisfaction but also support profitability optimization through effective bundling strategies. Furthermore, the findings are expected to contribute to the broader literature on service quality in buffet restaurant industry while offering practical guidance for using data-driven strategies to create competitive and relevant culinary experiences in local markets.

Methods

This study analyzes transaction data from Kedai Seblak Uwak located in Sintang, West Borneo, Indonesia, served as the study object to uncover purchasing patterns that inform bundling strategies for *seblak* products. The dataset consists of 3,406 transaction records from July 1, 2023 to July 28, 2024, collected from the store's point-of-sale (POS) system, detailing items purchased, quantities, and transaction timestamps, after preprocessing, which involved the removal of incomplete and irrelevant records, 3,302 valid transactions were retained for analysis. The key focus of this study is to identify frequent item combinations, especially for *seblak* toppings, and derive actionable insights for bundling products.

The data processed in three key stages. First, the dataset was reformatted into a transactional structure, where each transaction consisting of a list of items purchased. A necessary preparation for applying the Apriori algorithm to identify patterns and associations. In the second stage, data preprocessing was carried out to remove irrelevant variables, such as date, day, customer names, total transaction amounts, and beverages (e.g., iced tea, plain water, and mineral water), to simplify the dataset and focus on essential food items. The next step involved grouping similar food items into broader categories, such as merging *dumpling cheese* and *dumpling chicken* into "dumpling", and combining vermicelli and instant noodles into "noodles", while retaining some items like *fish roll* and *chikuwa* as standalone categories. This categorization streamlined product analysis while maintaining transactional significance. Subsequently, association rule mining was performed using the Apriori algorithm, focusing on three key metrics: support, confidence, and lift. A minimum support threshold of 2% identified frequently occurring itemsets, a confidence threshold of 45% ensured reliable association rules, and lift value greater than 1 to rank these rules based on their potential for joint sales. Association rules such as "If topping A is selected, topping B is likely to be chosen" were derived from the analysis. The equations for support, confidence, and lift values are as follows (Vijayalakshmi & Selvan, 2023):

$$Support\ (A) = \frac{Transactions\ that\ contain\ A}{Total\ Transactions} \quad (1)$$

$$Confidence\ (A \rightarrow B) = P(B) = \frac{Total\ transactions\ containing\ A\ and\ B}{Total\ Transactions} \quad (2)$$

$$Lift\ (A \rightarrow B) = \frac{Confidence\ (A \rightarrow B)}{Support\ (B)} = \frac{Total\ transactions\ containing\ A\ and\ B}{Total\ Transactions} \quad (3)$$

The primary focus was on uncover frequent combinations of *seblak* toppings purchased together. The analysis selected the top five product combinations with the highest values for bundling, presenting them as a single-serving *seblak prasmanan*. These insights enabled Kedai Seblak Uwak to create *seblak* bundles that align with customer preferences, improving product offerings and sales strategies. Additionally, a promotional poster was designed based on the results of the bundling analysis. The poster visually presents the top *seblak* topping combinations and promotes newly created single-bowl bundles. It serves as a

marketing tool to increase customer awareness of bundled products, thereby driving sales through targeted, visually appealing content.

Result and Discussion

1. Data Processing

The outcomes of this analysis are to determine the best combinations of the top five items that could be bundled into one bowl of *seblak prasmanan*. The analysis employed three key metrics: support, confidence and lift to identify which products were often purchased together and to assess the strength of the relationships among those products. After conducting the analysis, the selected items are the top five that complement each other to create an enjoyable dining experience for the customers. The data processed included 3,302 transactions from 17 itemsets, and the resulting itemsets from the analysis the are shown in Table 1.

Table 1: List of Item Set Formation

Code	Itemset	Jumlah	Support (%)
1	Dumpling	1647	49,8789
2	Meatballs	1654	50,0909
3	Fish Roll	1616	48,9400
4	Chikuwa	1677	50,7874
5	Fish Cake	1684	50,9994
6	Chicken Sausage	1684	50,9994
7	Half-sized Odeng	1644	49,7880
8	Twister	1620	49,0612
9	Noodles	1640	49,6669
10	Crackers	1677	50,7874
11	Enoki Mushrooms	1635	49,5154
12	Mustard Green	1657	50,1817
13	Cuanki	1646	49,8486
14	Chicken Egg	1686	51,0600
15	Tapioka Dough	1642	49,7274
16	Savory Meat Balls	1612	48,8189
17	Basreng	1691	51,2114

The data above consists of transactional data, including item codes, product categories, the quantity of products in each transaction, and the support for each product category. The stages to analyzing sales with the Apriori algorithm include selecting and cleaning the data to be analyzed to find all of product item were on list sales transaction to finding out amount of item on product transaction.

Table 2: List of Types of Items that are Frequently Bought Together

Code	Itemset	Support (%)
1	Basreng	51,2114
2	Chicken Egg	51,0600
3	Fish Cake	50,9994
4	Chicken Sausage	50,9994
5	Chikuwa	50,7874
6	Meatballs	50,0909
7	Crackers	50,7874
8	Mustard Green	50,1817

Table 2 represents items that most frequently bought together and meet the minimum support. From the data, the product with the highest support is *Basreng* at 51.2114%, indicating that this itemsets accounts for the highest proportion of transactions.

From the analysis, Table 3 represents the top five items most frequently bought together and chosen for one bowl of *seblak prasmanan*.

Table 3: List of Selected Items that are Meet the Minimum Support

Code	Itemset	Support (%)
1	Basreng	51,2114

Code	Itemset	Support (%)
2	Chicken Egg	51,0600
3	Fish Cake	50,9994
4	Chicken Sausage	50,9994
5	Mustard Green	50,1817

2. Metric Analysis

To analyze this data, three key metrics were applied: a minimum support threshold of 2% to identify frequently occurring itemsets, a confidence threshold of 45% to ensure reliable association rules, and lift value greater than 1 to rank these rules based on their potential for driving joint sales. Table 4 represents detailed information of the selected items that are meet the minimum three key metric: support, lift, and confidence.

Table 4: Selected Items that are Meet the Minimum Three Key Metric

Product Category	Support (%)	Lift	Confidence (%)
Basreng +Chicken Egg	51,0600	1,0285	52,5133
Chicken Egg + Fish Cake	50,9994	1,0065	50,2372
Fish Cake + Chicken Sausage	50,9994	1,0107	50,2969
Chicken Sausage + Mustard Green	50,1817	1,0109	49,8812

Table 5: Selected Items Combinations of Products that are Bundled

Product Category	Support (%)	Lift	Confidence (%)
Basreng + Chicken Egg + Fish Cake + Chicken Sausage + Mustard Green	3,4	1,0026	50,8100

After conducting the analysis, Table 5 represents the top five items combinations that will be bundled into one bowl.

3. Result Analysis

a) The combination of *Basreng*, Chicken Egg, Fish Cake, Chicken Sausage, Mustard Green has a support of 3,4% exceeding the minimum support threshold of 2%. Based on the assumption of independence within the dataset of 3,302 transactions, this result is both significant and promising for bundling. This suggests that a significant number of consumers prefer to select these top five items together in a dish. The mix offers a dining experience full of varied textures and flavors, making it particularly attractive to consumers.

b) A lift value of 1,0026 indicates that this product combination has a strong association. This means that if consumers purchase one or more items from this combination, there is a high likelihood they will also choose the other items. This demonstrates that these products complement each other well.

c) A confidence value of 50,8100% means that more than half of the consumers who choose one product from this combination are likely to select all five items in a single bowl. This indicates that these products are frequently chosen together by customers and are well-suited to be bundled into one bowl.

The selected product combination to be bundled into a bowl includes *Basreng*, Chicken Egg, Fish Cake, Chicken Sausage, Mustard Green. This combination is thoughtfully designed to provide a harmonious balance of flavors, textures, and nutritional value, ensuring a satisfying and varied culinary experience for consumers.

a) Taste and Balance
Each item in this mix brings a unique flavor that complements the others. *Basreng* provides a savory and spicy kick, while Fish Cake offers a soft, fish-based umami taste. Chicken Egg and Chicken Sausage add richness and protein, and Mustard Green introduces a fresh, vegetable-based element, creating a well-balanced and flavorful dish.

b) Market Appeal
This combination has broad market appeal, particularly for consumers looking for a tasty, high-protein snack. The traditional flavors of *Basreng* and Mustard Green appeal to local tastes, while Fish Cake and Chicken Sausage bring a modern twist, making it attractive to a wider audience.

c) Nutritional Value
This combination provides a balanced mix of macronutriens. Protein-rich ingredients like Chicken Egg, Chicken Sausage and Fish Cake support dietary needs, while Mustard Green contributes essential vitamins and fiber. *Basreng* adds carbohydrates, offering energy, making this dish a satisfying choice that blends indulgence with nutritional value.

d) Simpilfy and Innovation
Presented in a bowl, this product simpilfies eating, especially for busy consumers in urban areas with fast-paced lifestyles. Its innovative design add value in a competitive market by combining traditional ingredients with a modern, convenient format.

4. Bundling Strategy Implementation into One Bowl

Based on the analysis results, the recomendation is to bundle five items into one bowl of *Seblak,* offering a special price or discount. Here are some promotional strategies that could be used for the bundling :

a) Complete Bowl Package
Offer a bundling deal at a special price, such as a 15% discount when purchasing this package compared to buying each item separately.

b) Economy Combo
Each purchase of this five-item package comes with a free drink or a special topping option, such as crackers or spicy sambal.

c) Specific Day Promotion
To attract customers, offer bundling deals on specific days, such as weekends or during busy lunch hours.

5. Promotional Poster

To attract consumers, here is an example of a promotional bundling poster that can be displayed in the sales area.

Figure 1. Promotional Poster of *Seblak*

6. Discussion of Limitations

This Section discusses the limitations encountered during the study, which may have influenced the results or constrained the scope of the research. While this analysis provides valuable insights and strong recommendations for bundling strategies, certain limitations should be considered. One key limitation is the potential variation in customer preferences, which may impact the effectiveness of the bundling

strategy across different customer groups. As a result, i tis recommended that trials be conducted in specific locations, followed by further evaluations to assess customer responses and ensure that strategy's success. Future research could focus on evaluating customer satisfaction and exploring the possibility of adjusting the bundling strategy based on regional preferences and feedback from customers.

Conclusion

This study highlights the effectiveness of bundling strategies in increasing consumer satisfaction and sales for *seblak prasmanan*. Through the application of Market Basket Analysis (MBA) using Apriori algorithm, five items—*Basreng*, Chicken Egg, Fish Cake, Chicken Sausage, and Mustard Green—were identified as the optimal combination for a single bowl. This mix provides a complete culinary experience by combining savory flavors, protein-rich components, and fresh vegetables, making it both attractive and nutritions. The findings suggest that implementing this bundling strategy can streamline customer decision-making, enhance the dining experience, and contribute to higher sales and profitability. However, further research is needed to evaluate the impact of regional variations in customer preferences, which may influence the success of this bundling strategy in different locations. Additionally, conducting customer satisfaction surveys and trials in real-world settings could provide valuable insights to refine and adapt the bundling approach. By leveraging data-driven techniques, this research offers a practical framework for optimizing product offerings in the culinary industry, with potential applications for other foodservice businesses looking to improve customer engagement and operational efficiency.

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