

Application of Market Basket Analysis to Optimize Marketing Strategies in MSMEs Diah Cookies

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ABSTRACT

MSMEs Diah Cookies are micro businesses in the culinary sector that produce various types of pastries and other preparations. Even though it has daily sales transaction data, the use of this data in analyzing consumer behavior is still not optimal. This study aims to identify consumer purchasing patterns using Market Basket Analysis with Apriori algorithm. and designing a marketing strategy based on daily sales transaction data for the January-November 2024 period. The data is processed using RapidMiner Studio software. The results of the study shown that there was a pattern of buying products that were often purchased at the same time, such as the combination of Nastar Cheese and Sago Cheese associated with Kastangel Ori, Choco Rollcake with Cheese Rollcake, and Akuroti variant of Choco Chunk and Tiramisu associated with Oreo Cream Cheese. These patterns are used as the basis for the preparation of marketing strategies, such as product bundling, store layout arrangements, and product arrangement in storefronts (planograms). Based on the results of the study, the application of Market Basket Analysis has proven to be effective in providing relevant insights to support marketing strategy decision-making in Diah Cookies MSMEs.

Keywords: Market Basket Analysis¹, Apriori Algorithm², Marketing Strategy³.

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1. INTRODUCTION

MSMEs Diah Cookies which is located at Jl. Ketandan Baru II No. 6-A, Genteng, Surabaya has been producing various types of processed pastries and others since 2001 but has only expanded marketing outside of the holiday moment since 2012. After participating in various trainings such as branding, product value, packaging, and digital marketing through the Economic Hero Community. Even though it already has a physical store, this business has not utilized transaction data to analyze consumer purchasing patterns, so that product arrangement is not optimal, and the profit potential is less than optimal. Another challenge arises when seasonal demand spikes due to a lack in data analysis. To overcome this problem, a data-driven approach is needed, namely Market Basket Analysis.

Market Basket Analysis is an association technique for finding groups of products that are often purchased together in a transaction. So that it can be used as a basis for developing marketing strategies, such as product bundling, store layout arrangement, and product arrangement in a storefront (planogram). The implementation of an MBA allows businesses to

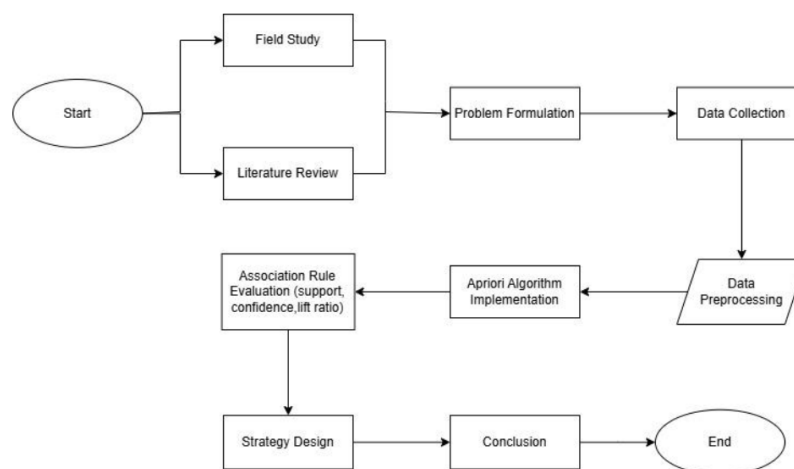
increase sales while optimizing product stock management [1]. This is because MBAs allow for more accurate stock planning and store layout adjustments to encourage impulse purchases and reduce the risk of overstock, thereby supporting operational efficiency and maximizing profits.

One of the popular algorithms in MBA is Apriori, which is widely used to find association patterns based on frequently appearing itemset [2]. The algorithm is based on previously known frequent item sets. This algorithm is efficient because it trims the k-itemset candidate if it is found that the subset of the k-1 size does not meet the minimum support threshold, thus reducing the number of combinations that need to be tested [3]. There are several previous studies that show that MBA is effective in overcoming this problem. As recent research by [4], titled "Application of Association Rule Method Using Apriori Algorithm to Find Sales Patterns Case Study of Indomaret Tanjung Anom" shows that Apriori it is able to find a pattern of product combinations between detergent and toothpaste with confidence 80%, which can support stock management and promotion. Furthermore, research by [5] titled "Consumer Purchasing Patterns with the MBA Method on Perishable Products at Ikobana Bakery" Producing a promotional combination of melon pan bread and korean cheese garlic with a minimum support of 40% and confidence of 60%. As well as a combination of regular sales of chocolate cheese bread with min support 20% and confidence 55%. With marketing strategies, product bundling and price bundling are recommended. Research by [2] titled "Comparison of Apriori and FP-Growth Algorithms Against MBA on Bakery Sales Data" shows Apriori finding a combination pattern of alfajores and coffee with a confidence value of 54.06%. Meanwhile, FP-Growth showed a combination of pastry and coffee with a confidence value of 55.21%.

Based on the background, to increase efficiency in developing marketing strategies based on sales transaction data, an in-depth analysis of consumer purchasing patterns is needed. Therefore, the author is interested in taking the title "The Application of Market Basket Analysis for Marketing Strategy Optimization in Diah Cookies MSMEs".

2. METHODS

In this study, the method used is Market Basket Analysis with an Apriori algorithm to identify consumer purchase patterns that occur simultaneously, so that it can be used as a basis for making marketing strategy decisions in Diah Cookies MSMEs. Research flow of this study explained in the Figure 1.



Picture 1. Research Flow

2.1 Field Studies

Conducted a direct interview with the owner, Mrs. Diah Arvianti, to identify the problems that occurred, such as unstructured promotions and lack of analysis of purchasing patterns to understand store operations and the potential use of transaction data.

2.2 Studi Literature

Learn references related to Market Basket Analysis and Apriori algorithms. The literature is used to understand the parameters of support, confidence, and lift ratio.

2.3 Problem Formulation

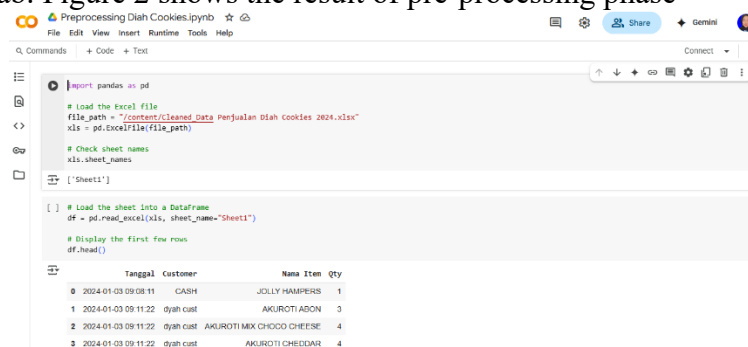
The main problem is the growing use of historical data to identify consumer purchasing patterns, which has an impact on marketing strategies.

2.4 Data Collection

Using Diah Cookies' daily sales transaction data for the January-November 2024 period, there are 46,375 lines of data.

2.5 Pre-processing Data

To ensure that the data used is clean, consistent, and suitable for analysis. Starting with the data cleanup stage, by deleting duplicate data and incomplete transactions such as item names and quantities with negative values or 0. Continue to filter the data by removing irrelevant attributes. Then transform the data so that each date contains a list of the names of items purchased together. All pre-processing stages are processed using Google Collab. Figure 2 shows the result of pre-processing phase



```

import pandas as pd

# Load the Excel file
file_path = "/content/Cleaned Data Penjualan Diah Cookies 2024.xlsx"
xls = pd.ExcelFile(file_path)

# Check sheet names
xls.sheet_names

['Sheet1']

[] # Load the sheet into a DataFrame
df = pd.read_excel(xls, sheet_name="Sheet1")

# Display the first few rows
df.head()

```

	Tanggal	Customer	Nama Item	Qty
0	2024-01-03 09:08:11	CASH	JOLLY HAMPERIS	1
1	2024-01-03 09:11:22	diah cust	AKUROTTI ADON	3
2	2024-01-03 09:11:22	diah cust	AKUROTTI MIX CHOCO CHEESE	4
3	2024-01-03 09:11:22	diah cust	AKUROTTI CHEEDAR	4

Figure 2. Pre-Processing Phase

2.6 Application of a priori algorithm

By setting the minimum support and confidence value parameters as a threshold to find the combinations of items that appear frequently. The process is carried out iteratively, starting from a single item to a combination of several items. Once the itemset is frequently found, the association rules are evaluated based on parameter values to demonstrate the strength and relevance of the relationship.

2.7 Evaluation of Association Rule

Associate rules are evaluated based on support value (the frequency of transactions involving a combination of items), confidence (the likelihood that another item will be purchased if one item is purchased), and lift ratio (the effectiveness of the rule compared to random purchases).

2.8 Strategy Planning

Based on results that include product combinations, these patterns provide strategic insights into consumer behaviours and specific product preferences. This pattern will be used as the basis for developing marketing strategies that aim to increase sales and strengthen customer loyalty.

3. RESULTS AND DISCUSSION

The research was conducted by direct interviews with MSME owner Diah Cookies. Discussions were conducted to gain an in-depth understanding of the sales process, transaction data management, and marketing strategies.

3.1 Data Collection

A. Product Categories explained in Table 1.

Table 1. Product Categories

No	Category	Subcategories
1	Pastries	Monas cookies, Nutella cookies, choco stick, choco chip almond, choco oatmeal, sago cheese, castangel (ori, potato), snow white (butter, cheese, milk), bagor cookies, cat tongue, milk bean cookies, nastar (cheese, ori, wisjman), nastar box, palm cheese, corn flakes.
2	Bakery Series by Akuroti	Akuroti banana cheese, almond milky, mix, sosis, blueberry, tiramisu, abon, choco (oreo, chunk, cheese, banana), oreo cream cheese, cheddar.
3	Cake	Red cake, choco cake, BL slice, BF cake, fruit cake, choco slice, burnt cheese cake, choco cake, red velvet cake, vanilla cake, vanilla slice, rollcake (keju vanilla, keju, red, choco, double cheese choco, chocolate brownies), marble cake.
4	Balls	Braided bread, tiramisu, cheese, chocolate, milk bun, cheese donuts, bolen, macaron.

B. History of Daily Sales Transaction

This study uses Diah Cookies daily sales transaction data for the January-November 2024 period totalling 46,375 lines of data with attributes such as date, branch, channel, customer, cashier, item name, quantity, unit, discount, price, note discount, subtotal, and total. Data of historical sales transactions explained in Figure 3.

	A	B	C	D	E	F	G	H	I	J	K	L	M
	Tanggal	Cabang	Channel	Customer	Kasir	Nama Item	Qty	Satuan	Disc	Harga	Diskon Nota	SubTotal	Total
2	2024-01-03 09:08:11	Pusat	Store	CASH	Kasir Utama	JOLLY HAMPER	1	PCS	Rp -	Rp 315.000	Rp -	Rp 315.000	Rp 315.000
3	2024-01-03 09:11:22	Pusat	WhatsApp	dyah rust	Kasir Utama	AKUOTI ABON	3	PCS	Rp -	Rp 12.000	Rp 5.517	Rp 36.000	Rp 221.000
4	2024-01-03 09:11:22	Pusat	WhatsApp	dyah rust	Kasir Utama	AKUOTI MIX CHOCO CHEESE	4	PCS	Rp -	Rp 12.000	Rp 7.356	Rp 48.000	
5	2024-01-03 09:11:22	Pusat	WhatsApp	dyah rust	Kasir Utama	AKUOTI CHEDDAR	4	PCS	Rp -	Rp 12.000	Rp 7.356	Rp 48.000	
6	2024-01-03 09:11:22	Pusat	WhatsApp	dyah rust	Kasir Utama	AKUOTI BLUEBERRY	3	PCS	Rp -	Rp 12.000	Rp 5.517	Rp 36.000	
7	2024-01-03 09:11:22	Pusat	WhatsApp	dyah rust	Kasir Utama	AKUOTI CHOCO	4	PCS	Rp -	Rp 12.000	Rp 7.356	Rp 48.000	
8	2024-01-03 09:11:22	Pusat	WhatsApp	dyah rust	Kasir Utama	AKUOTI ALMOND MILKY	2	PCS	Rp -	Rp 12.000	Rp 3.678	Rp 24.000	
9	2024-01-03 09:11:22	Pusat	WhatsApp	dyah rust	Kasir Utama	Gingir	1	X	Rp -	Rp 21.000	Rp 3.218	Rp 21.000	
10	2024-01-03 09:13:05	Pusat	WhatsApp	Ila	Kasir Utama	PUTRI SALU SUSU 250GR	1	PCS	Rp -	Rp 65.000	Rp -	Rp 65.000	Rp 65.000
11	2024-01-03 09:47:08	Pusat	Store	CASH	Kasir Utama	AKUOTI ABON	2	PCS	Rp -	Rp 12.000	Rp 4.000	Rp 24.000	Rp 60.000
12	2024-01-03 09:47:08	Pusat	Store	CASH	Kasir Utama	AKUOTI CHEDDAR	2	PCS	Rp -	Rp 12.000	Rp 4.000	Rp 24.000	
13	2024-01-03 09:47:08	Pusat	Store	CASH	Kasir Utama	AKUOTI CHOCO	2	PCS	Rp -	Rp 12.000	Rp 4.000	Rp 24.000	
14	2024-01-03 09:55:24	Pusat	Store	CASH	Kasir Utama	AKUOTI CHOCO	2	PCS	Rp -	Rp 12.000	Rp 4.000	Rp 24.000	Rp 50.000
15	2024-01-03 09:55:24	Pusat	Store	CASH	Kasir Utama	AKUOTI MIX CHOCO CHEESE	2	PCS	Rp -	Rp 12.000	Rp 4.000	Rp 24.000	
16	2024-01-03 09:55:24	Pusat	Store	CASH	Kasir Utama	AKUOTI ALMOND MILKY	1	PCS	Rp -	Rp 12.000	Rp 2.000	Rp 12.000	
17	2024-01-03 09:57:23	Pusat	WhatsApp	rivana	Kasir Utama	AKUOTI MIX CHOCO CHEESE	2	PCS	Rp -	Rp 12.000	Rp 4.000	Rp 24.000	Rp 50.000
18	2024-01-03 09:57:23	Pusat	WhatsApp	rivana	Kasir Utama	AKUOTI CHEDDAR	3	PCS	Rp -	Rp 12.000	Rp 6.000	Rp 36.000	
19	2024-01-03 10:09:14	Pusat	WhatsApp	Ila	Kasir Utama	PALM CHEESE 200GR	1	PCS	Rp -	Rp 50.000	Rp -	Rp 50.000	Rp 534.000
20	2024-01-03 10:09:14	Pusat	WhatsApp	Ila	Kasir Utama	PUTRI SALU SUSU 250GR	1	PCS	Rp -	Rp 65.000	Rp -	Rp 65.000	
21	2024-01-03 10:09:14	Pusat	WhatsApp	Ila	Kasir Utama	NASTAR ORI 250GR	1	PCS	Rp -	Rp 85.000	Rp -	Rp 85.000	
22	2024-01-03 10:09:14	Pusat	WhatsApp	Ila	Kasir Utama	KASTANGEL ORI 250GR	1	PCS	Rp -	Rp 85.000	Rp -	Rp 85.000	
23	2024-01-03 10:09:14	Pusat	WhatsApp	Ila	Kasir Utama	CHOCO CHIP ALMOND	1	PCS	Rp -	Rp 90.000	Rp -	Rp 90.000	

Figure 3. Initial Data

3.2 Data Processing

A. Pre-Processing of Data

This stage is carried out to ensure that the data is clean and ready for analysis. The analysis is carried out per category so that the support and confidence values remain significant. In RapidMiner, the selection of products per category is done with the "Select Attribute" feature. The data was cleaned by removing non-bakery and packaging products, reducing the data from 46,375 to 39,647 lines of data. Irrelevant features such as branches, channels, and prices are also removed because they are not needed in association analysis.

After that, the grouping stage is carried out by grouping transactions based on time, so that each transaction represents one purchase receipt that includes a list of products purchased together. The result of this process is 11,429 transaction data and its shown in Figure 4.

Tanggal	Transaksi	Nama Item
2024-01-03 09:08:11	1	['JOLLY HAMPER']
2024-01-03 09:11:22	2	['AKUROTI ABON', 'AKUROTI MIX CHOCO CHEESE', 'AKUROTI CHEDDAR', 'AKUROTI BLUEBERRY', 'AKUROTI CHOCO', 'AKUROTI ALMOND MILKY']
2024-01-03 09:13:05	3	['PUTRI SALJU SUSU 250GR']
2024-01-03 09:47:08	4	['AKUROTI ABON', 'AKUROTI CHEDDAR', 'AKUROTI CHOCO']
2024-01-03 09:55:24	5	['AKUROTI CHOCO', 'AKUROTI MIX CHOCO CHEESE', 'AKUROTI ALMOND MILKY']
2024-01-03 09:57:23	6	['AKUROTI MIX CHOCO CHEESE', 'AKUROTI CHEDDAR']
2024-01-03 10:09:14	7	['PALM CHEESE 200GR', 'PUTRI SALJU SUSU 250GR', 'NASTAR ORI 250GR', 'KASTANGEL ORI 250GR', 'CHOCO CHIP ALMOND', 'SAGU KEJU']
2024-01-03 10:42:08	8	['AKUROTI SMOKED BEEF', 'AKUROTI BLUEBERRY', 'AKUROTI ABON', 'AKUROTI ALMOND MILKY', 'AKUROTI SOSIS']
2024-01-03 10:50:34	9	['AKUROTI CHOCO']

Figure 4. Pre-Processing Result

In addition, deleting transactions that contain only one type of product because it does not provide information on the relationship between products. Data pre-processing is important to improve the quality of analysis results by removing irrelevant data and correcting inconsistencies [2]. After all stages are carried out, 8,833 lines of transaction data are obtained that are ready for analysis. Purchase receipt categories shown in Table 2.

Table 2. Purchase Receipt	
Transaction	Category
1	Akuroti abon, mix choco cheese, cheddar, blueberry, choco, almond milky.
2	Akuroti abon, cheedar, choco.
3	Akuroti choco, mix choco cheese, almond milky.
...	...
8.833	Akuroti oreo cream cheese, choco, Nutella cookies, nastar wijzman.

B. Data Transformation Category

It is done by forming a basket frame data, which is converting transaction data into a pivot table, where each product name becomes a column and transactions are represented binarily: 1 for the purchased product and 0 if not purchased. The transformation results of 11,429 in binary form were then deleted for transactions that contained only one product because they did not show a relationship, leaving 8,833 lines of data. Data transformation results shown in Figure 5.

Tanggal	Transaksi	AKUROTI BLUEBERRY	Akuroti Mix	Macaron	Redvelvet Cake	BOLEN	SAGU KEJU	Choco Slice	ROLLCAKE KEJU	BF CAKE
2024-01-03 09:11:22	1	1	0	0	0	0	0	0	0	0
2024-01-03 09:47:08	2	0	0	0	0	0	0	0	0	0
2024-01-03 09:55:24	3	0	0	0	0	0	0	0	0	0
2024-01-03 09:57:23	4	0	0	0	0	0	0	0	0	0
2024-01-03 10:09:14	5	0	0	0	0	0	1	0	0	0
2024-01-03 10:42:08	6	1	0	0	0	0	0	0	0	0
2024-01-03 11:04:06	7	0	0	0	0	0	0	0	0	0
2024-01-03 11:05:36	8	0	0	0	0	0	0	0	0	0
2024-01-03 11:08:03	9	1	0	0	0	0	0	0	0	0

Figure 5. Data Transformation Results

C. Determination of Category Data Parameters

Parameter determination is done by trial and error by trying various combinations and evaluating the number and relevance of the rules formed until optimal results are obtained [6]. Therefore, there are no standard values and parameters must be adjusted to the characteristics of the data and the purpose of the analysis.

3.3 Association Identification

As for the modelling that has been created to identify with the RapidMiner software as explained in the Figure 6.

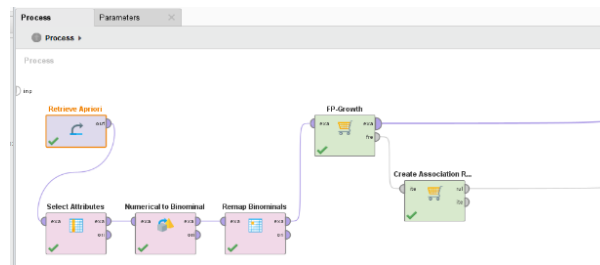


Figure 6. RapidMiner Modelling

A. Identification and Interpretation of Associations Between Categories

This level analysis aims to uncover hidden cross-category relationships, which are empirically found to influence purchasing decisions, where products from different complementary categories are often purchased together [7]. At this stage, a minimum support value of 0.05 and a confidence value of 0.5 is used to obtain significant but not very common results.

Based on the results of the identification that shown in Table 3, the system generates four rules. However, after the threshold limit was applied according to the minimum confidence criteria, only two rules passed and were declared valid.

Table 3. Identification & Association Between Categories

Premises	Conclusion	Support	Confidence	Lift ratio
Snow White Cheese	Kastangel ori	0.030	0.508	1.952
Akurotti Choco Chunk, Akurotti Tiramisu	Akuroti oreo cream cheese	0.021	0.563	5.168

The first rule shows the combination of Snow White Cheese products with Kastangel Ori with 3% support for all transactions containing both products. A confidence of 50.8% means that the consumer is a big chance of buying a product **Snow White Cheese** with **Kastangel Ori**. And lift values that are close to 2 indicate a strong relationship and not random. The second rule indicates a relationship **Akuroti Choco Chunk** and **Akuroti Tiramisu** with **Akuroti Oreo Cream Cheese**, with a support value of 2.1%, confidence 56.3%, and elevator <5. Indicates a very strong relationship and consumers tend to buy all three variants together due to similarities in taste or preferences.

B. Identification & Interpretation of Product Subcategory Associations

a) Pastry Category

Using the minimum parameters of support 0.04 and confidence 0.5 results in six association rules. However, only two rules passed and were considered valid with a confidence value above the threshold. Table 4 explains the result of pastry category.

Table 4. Pastry Category

Premises	Conclusion	Support	Confidence	Lift Ratio
Nastar ori, red velvet milky	Kastangel ori	0.022	0.521	2.005
Nastar cheese, sago cheese	Kastangel ori	0.019	0.585	2.250

The first rule, combination of **Nastar Ori** and **Red Velvet Milky** Associated with **Kastangel Ori**. Support of 2.2% indicates that rules emerge from all transactions, with 52.1% of the purchase of all three products. As well

as the 2,005 elevators, the chances of buying Kastangel Ori doubled if consumers bought both products at the same time. The rule of both combinations **Cheese Nastar** and **Cheese Sago** with **Kastangel Ori** support was obtained from 1.9% of the total transaction. Confidence 58.5% of consumers who buy premises products will buy conclusion products. And the 2,250 elevator strengthens the possibility of buying an increase of 2.25 times.

b) Bakery Series Category

Using the min support parameters 0.09 and confidence 0.5 results, that shown in Table 5, in a single rule being formed.

Table 5. Bakery Series Category

Premises	Conclusion	Support	Confidence	Lift Ratio
Akurotti Choco Chunk, Akurotti Tiramisu	Akuroti oreo cream cheese	0.021	0.563	5.168

Kombinasi **Akuroti Choco Chunk** and **Akuroti Tiramisu** associated with **Akuroti Oreo Cream Cheese**. The support value of 2.1% of all transactions contains all three items. Confidence 0.563 shows that the transaction covers both premises' products 56.3% of which are also conclusion products. And the elevator value shows that the possibility of buying Akuroti Oreo Cream Cheese is five times higher when buying both items.

c) Cake Category

Using the minimum parameters of support 0.09 and confidence 0.5 results in two complementary rules. Table 6 explains the result of cake category.

Table 6. Cake Category

Premises	Conclusion	Support	Confidence	Lift Ratio
Rollcake Choco	Rollcake Keju	0.019	0.663	22.517

Product Combinations **Rollcake Choco** associated with **Rollcake Keju** and vice versa have a strong relationship. The support value of 1.9% of the total purchase transaction was both at the same time, with a confidence of 66.3% indicating that transactions containing premises products also purchased conclusion products. And the elevator indicates that consumers who buy Cheese Rollcakes are 22.5 times larger than apabo a also buy Choco Rollcake.

d) Category Bolen

The bolen category, which includes only a few products, has only 1,665 transaction data out of a total of 8,833 transactions. Association analysis does not result in rules in this category, as it shows individual buying patterns. This is in line with the opinion that association analysis often fails to form a significant rule in categories with low transaction numbers, as the support minimum value needs to be raised to avoid noise patterns so that the model cannot extract insights [8].

C. Identification and Interpretation of Product Item Associations

At this stage, the researchers analysed only 11 active products that had previously appeared in the association rules to maintain efficiency and avoid insignificant combinations. The k-itemset candidate trimming stage is done by deleting items sets that do not meet the minimum support according to the Apriori principle that any subset of the itemset appears frequently [9]. The analysis using the minimum support parameters of 0.09 and confidence 0.5 resulted in six rules of

which only four passed the screening according to the confidence criteria and were considered valid and relevant. The results shown in Table 7.

Table 7. Identification & Interpretation of Product Item Associations

Premises	Conclusion	Support	Confidence	Lift Ratio
Akuroti Choco Chunk, Akuroti Tiramisu	Akuroti oreo cream cheese	0.021	0.563	5.168
Nastar cheese, sago cheese	Kastangel ori	0.019	0.585	2.250
Rollcake Keju	Rollcake Choco	0.019	0.658	22.517
Rollcake Choco	Rollcake Keju	0.019	0.663	22.517

Analysis at the item level yielded four association rules with support values of $\geq 9\%$ and confidence $\geq 50\%$, indicating a strong correlation between specific products. The first rule of combination **Akuroti Choco Chunk** and **Akuroti Tiramisu** with **Akuroti Oreo Cream Cheese** with an elevator value of >1 indicating a significant relationship and not a coincidence [10]. Next combination **Cheese Nastar** with **Kastangel Ori** which has a confidence value of >2 indicates that combinations tend to be large. And the third and fourth rules complement each other between **Rollcake Keju** and **Rollcake Choco** with a very high lift value, it indicates that the relationship between the two variants is very strong.

3.4 Relationship of Association Results

The association analysis showed consistent and mutually reinforcing consumer purchasing patterns, reflecting stable preferences [5]. The products of the pastry category and Akuroti have significant cross-variant associations, such as Snow White Cheese and Kastangel Ori, as well as Akuroti Choco Chunk and Akuroti Oreo Cream Cheese consistently appear at various levels of analysis. In the subcategory, the combination of Nastar and Cheese Sago also leads to Kastangel Ori, while cake shows a strong connection between Cheese Rollcake and Choco Rollcake. In contrast, the bolen category does not form an association pattern due to low transactions, which significantly lowers the chances of establishing a rule association [8]. Overall, these patterns show that buying behavior is predictable and supports data-driven marketing strategies.

3.5 Marketing Strategy

The marketing strategy in this study is focused on product bundling and store arrangement, based on results that show strong linkages. This strategy aims to help Diah Cookies MSMEs increase sales and customer satisfaction. This approach is in line with [11] which states that bundling, especially when combined with the right brand image and display, will encourage impulse buying in the food and beverage segment. In addition, a study by [12] Strengthening this, by proving that the combination of bonus packs and strategic display layouts can increase consumers' impulsive decisions.

A. Product Bundling

It is a strategy to combine several products in one sales package to increase transaction value, introduce new variants, and offer more attractive prices. According to [13] stating that bundling can increase consumer perception of value and drive sales.

The results of the analysis showed a strong association between Snow White Cheese, Nastar Ori, Nastar Cheese, Sago Cheese, and Red Velvet Milky against Kastangel Ori. Therefore, it is recommended to create a bundling offer labeled "Cookies Favorite" with Kastangel Ori as the core, which can be sold in hampers

or seasonal edition packaging. Furthermore, in the bakery series category, there is a relationship between Akuroti Choco Chunk, Akuroti Tiramisu, and Akuroti Oreo Cream Cheese which can be offered labeled "Akuroti Best Combo" for sweet and creamy bread fans. For the cake category, the strong association between Rollcake Choco and Rollcake Cheese supports bundling offerings labeled "Rollcake Duo" as an event or souvenir serving option.

B. Store Proposal Layout

This strategy aims to improve customer comfort, space efficiency and support data-driven marketing. The checkout area is placed at the front of the store, adjacent to a showcase for cake category products to encourage impulse purchases. Next to the cashier, there is a storage display to display products from cross-category associations, to encourage additional purchases at checkout. This is in line with the theory *Retailing Management* which means that strategic placement in the cashier area can increase the purchase value.

Along the wall there are multi-storey vertical shelves to place products in the pastry category to be more organized, while the central table for the bakery series is the main point of attention. This arrangement is consistent according to the opinion [14] which shows product displays and price discounts in the checkout area significantly increases impulse buying. Further by [15] note that well-designed visual merchandising and discount promotions reinforce impulsive purchasing decisions. Figure 7 to 11 shows the store proposal layout.

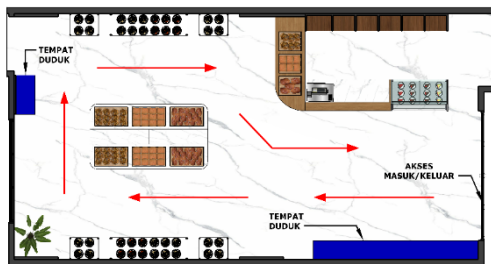


Figure 7. Plan

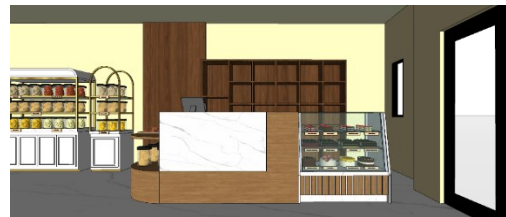


Figure 8. Perspective 1



Figure 9. Perspective 2



Figure 10. Perspective 3



Figure 11. Perspective 4

C. Planogram

This strategy is part of visual marketing that systematically arranges products based on consumer behaviours patterns [16]. It aims to increase impulse purchases, speed up decision-making, and increase the average value of transactions. The principle of eye level and visual merchandising techniques are used to highlight the interconnectedness between products.

a) Planogram Adopts Category

The arrangement is focused on the side shelves of the checkout to trigger impulse purchases. Top shelf features Akuroti Oreo Cream Cheese in the Center as a conclusion product, accompanied by Choco Chunk and Tiramisu on the side left side right to create an interesting visual effect. The bottom shelf features Kastangel Ori and Snow White Cheese, reinforcing associations and encouraging purchases based on actual data. Table 8 explains the planogram adopts category and Figure 12 shows the visualization of it.

Code	Premises	Code	Conclusion
P1	Snow White Cheese	C1	Kastangel Ori
P2 & P3	Akuroti Choco Chunk, Tiramisu	C2.3	Akuroti Oreo Cream Cheese

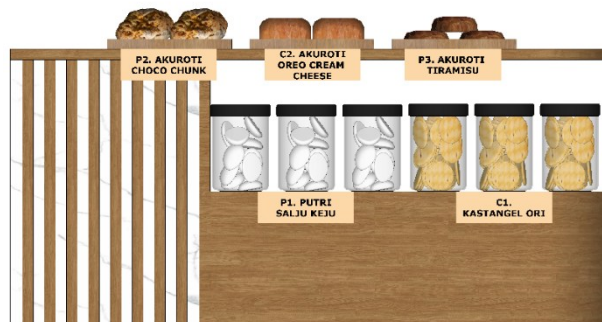


Figure 12 Planogram Adopts Category

b) Pastry Planogram

The arrangement is carried out on three-level storefront shelves to increase visibility and purchase potential. The top shelf features Nastar Ori and Red Velvet Milky as product premises with striking colors to attract attention. The Middle Shelf places Kastangel Ori in the eye level position as a conclusion product with high demand. As well as the bottom shelf is filled with Nastar Cheese and Cheese Sago for visual balance and ease of access. Figure 18 shows the general arrangement without Diah Cookies' current association strategy, and figure 19 shows a transaction-data-driven planogram, which groups products according to purchasing patterns to increase visual appeal and co-purchase opportunities. Table 9 explains the pastry planogram and Figure 14 shows the visualization of it. Figure 13 shows the current storefront.

Code	Premises	Code	Conclusion
P1 & P2	Nastar Ori, Red Velvet Milky	C1.2.3.4	Kastangel Ori
P3 & P4	Cheese Nastar, Cheese Sago		



Figure 13. Current Storefront

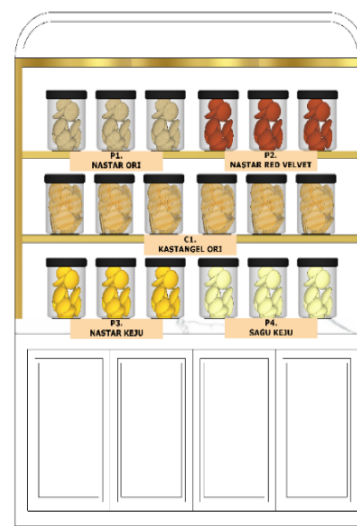


Figure 14. Pastry Planogram

c) Bakery Series Planogram

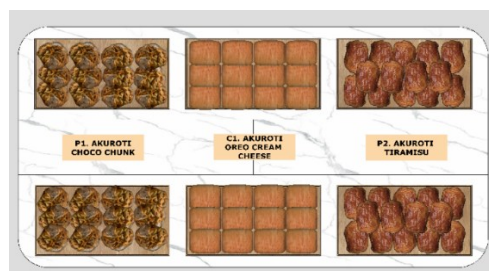
Planogram bakery series uses flat tables as the main promotional area. The superior product or conclusion, namely Akuroti Oreo Cream Cheese, is placed in the center as the center of attention, then accompanied by Akuroti Choco Chunk and Tiramisu on the left and right sides to create a halo effect and strengthen visual appeal. Figure 20 below is the current arrangement of Diah Cookies, then figure 20 of the planogram results of the association.

Table 10. Planogram Bakery Series

Code	Premises	Code	Conclusion
P1 & P2	Akurotti Choco Chunk, Akurotti Tiramisu	C1	Akuroti Oreo Cream Cheese



Picture 15. Current Display Desk



Picture 16. Bakery Series Planogram

d) Cake Planogram

The planogram cake is placed in a cooling showcase to maintain the quality of the product. Arrangement follows the principles of visual merchandising. The data-driven ones include adding variations in one line and consistency between lines to improve the perception of store completeness. The top is placed a small and easy-to-reach slice cake, the middle part displays rollcake variants as a conclusion product and premises product to be the main focus, and the bottom is placed a large whole cake for special needs such as celebrations. This strategy is in line with [17], which shows that layered product placement and strategic arrangement of sub-lines greatly affect product visibility and shopping experience. Here is Figure 17 of the current showcase

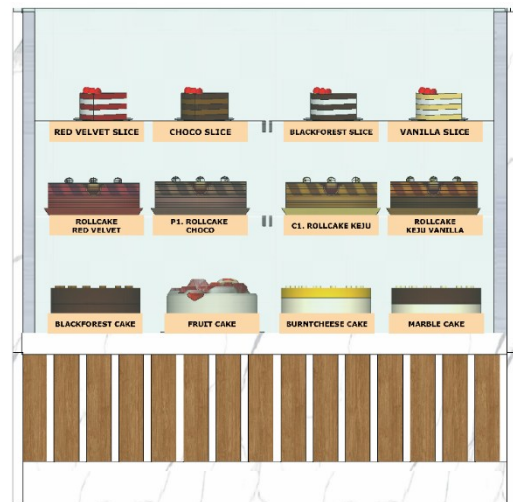
of Diah Cookies, and Figure 18 of the planogram that has been in accordance with the results of the association.

Table 11. Planogram Cake

Code	Premises	Code	Conclusion
P1	Rollcake Choco	C1	Rollcake Keju



Picture 17. Current Showcase



Picture 18. Cake Planogram

e) Bolen Planogram

The arrangement of Diah Cookies bolen products relies on visuals and promotions because no significant associations between variants are found. Even without an association pattern, this product is still strategic and requires a branding approach and consumer psychology. Products are placed in line with each variant's label such as "Bolen Fresh Today" to create an exclusive impression, strengthen the store's image, and attract shoppers. This is in line with the findings [18], which shows a prominent visual design, significantly improving the perception of quality and buying interest.

CONCLUSION

Based on the results of this study, it was successful in identifying consumer purchasing patterns in Diah Cookies MSMEs using Market Basket Analysis with a data based Apriori algorithm. Several association patterns were found such as the combination of Nastar Cheese and Cheese Sago with Kastangel Ori, Akuroti Choco Chunk and Tiramisu with Oreo Cream Cheese, and Choco Rollcake with Cheese Rollcake. A high lift value indicates a strong correlation and does not occur randomly. These results are the basis for the preparation of marketing strategies such as product bundling, store layout arrangements, and planogram preparation. Thus, the A priori algorithm has proven to be effective in indicating consumer purchasing patterns and generating marketing strategies that can increase sales of Diah Cookies.

Suggestions for future researchers are regular updates of transaction data are required to keep the results of association analysis relevant to changing purchasing patterns. These updates can also improve accuracy in strategy determination. The resulting strategy needs to be immediately implemented in store operations to determine its effectiveness. This research is expected to be a reference for other MSMEs in optimizing the use of data.

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