

Application of Market Basket Analysis on Beauty Clinic to Increasing Customer's Buying Decision

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Abstract: Beauty care and the need for cosmetics have become the lifestyle of modern women, especially in big cities. Public awareness to look beautiful makes modern women competing to take care of themselves to be more beautiful. The body care industry in Indonesia continues to grow. The growth has reached 6% and is predicted to continue to grow along with the high concern of Indonesian women in caring for their skin. To win the competition, companies need to know the market and consumer situation. One strategy that can be applied by the company is to use a promotional or advertising strategy. This research was conducted at the Ariana Audy beauty clinic in 2022 with the aim of identifying customer buying patterns which will then be used as reference material in the development of promotional menus for products and services offered by the beauty clinic. The approach used to design components on the promotional menu is Market Basket Analysis by applying the fp-growth algorithm using rapid miner software. Market basket analysis is focused on finding relationships between products based on customer purchases. The market basket analysis conducted resulted in 5 association rules that define consumer purchasing patterns for products and services provided by the Ariana Audy clinic. Through the 5 association rules formed, 3 promotional menus were produced, namely menu 1 consisting of baby skin crystal and oxy blue cream, menu 2 consisting of brightening cream products and sunscreen brightening, and menu 3 consisting of oxy jet peel and photodynamic therapy.

Keywords: Clinic, Promotion, Market Basket Analysis, Association Rule, FP-Growth, Rapid Miner

INTRODUCTION

The availability of management enables business entities to adequately respond to threats through the development and implementation of efficient behavioral strategies and the implementation of appropriate crisis management measures to minimize risks in the face of uncertainty. Uncertainty refers to the discrepancy between the information a customer has and that a company can provide (Putera, 2021)

Beauty care and the need for cosmetics have become the lifestyle of modern women, especially in big cities. Public awareness to look beautiful makes modern women competing to take care of themselves to be more beautiful. That's why in Indonesia there are beauty salons or beauty clinics in big cities. Supported by modern technology and professional beauticians (Wibowo & Pandu, 2013)

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From now on, the beauty care business is used as a great business opportunity. Seeing the needs of society in general who always want to look perfect. Endless desires according to the demands of the times. Therefore, the beauty clinic business can be said to be a promising business opportunity. Especially in big cities that meet the needs of people in modern society

The body care industry in Indonesia continues to grow. The growth has reached 6% and is predicted to continue to grow along with the high concern of Indonesian women in caring for their skin. Supported by a high population and productive age, Indonesia is counted as the largest skin care market in the world. Indonesia is considered to be the second largest contributor to skin care growth in the world, followed by the United States in third position, South Korea in fourth position and India in fifth position in terms of business growth (Ratna Sari Rahayu, 2019)

To win the competition, companies need to know the market and consumer situation (Handoyo et al., 2023). Every company is required to continue to innovate in order to survive in its business. For this reason, the company is making maximum efforts to increase its competitiveness through the strategies implemented by the company to become a world-class company (Putera et al., 2022). One strategy that can be applied by the company is to use a promotional or advertising strategy. One promotional strategy is discounts. Discount is a simple form of sales promotion because it is only a temporary reduction in product prices (Putra et al., 2016). Products with many discounted prices are the most sought-after products. The handling of the promotion itself requires a special way to determine the discounted price. The layout in supermarkets must also be considered by retail stores. The most common product layout design method, the most common promo for each product is Market Basket Analysis which is applied to determine the proximity of product groups based on how often these items are purchased together (Artsitella et al., 2021) (Halim et al., 2019)

A major challenge for the industry is customer data collection. Market Basket Analysis is the acquisition of analytical techniques focused on finding relationships and relationships between products based on customer purchases (Leote et al., 2020). Market Basket Analysis helps analyze the likelihood of customers buying different products simultaneously. Analyzing buying patterns can help improve marketing methods to increase sales and increase profits. Most of the unused data is stored in archives to be used as sales reports (Hermina, 2022)

So far, at Ariana Audy Clinic, there has never been an application of relationship analysis between products often purchased by customers and purchasing patterns made by customers. The clinic has also never implemented an analysis of best-selling products so that it can apply discounts from these best-selling products with the aim of improving marketing strategies. Therefore, companies need to review management policies regarding the application of spending patterns most often purchased by customers, the layout of products most often purchased by customers, and the preparation of products that are most purchased by customers.

METHOD

In this section, each researcher expected to be able to make the most recent contribution related to the solution to the existing problems. Researchers can also use images, diagrams, and flowcharts to explain the solutions to these problems.

Data Collection Methods

The methodology used to collect the data is as follows:

Field research by conducting direct observations and interviews with research objects in the field, especially in the administrative department.

Collect historical data, record and study files related to aspects needed to support research.

Data Processing Methods

Data processing is carried out by the Association Rules Market Basket Analysis (ARMBA) method with the following procedures:

Data cleaning in accordance with the required criteria, namely, data will be used if in a transaction there are at least 2 different products.

Transform transaction data based on the list of products and services offered at Ariana Audy Beauty Clinic in binomial form.

Data processing using the FP-Growth algorithm in the Rapid Miner software to identify products that appear together.

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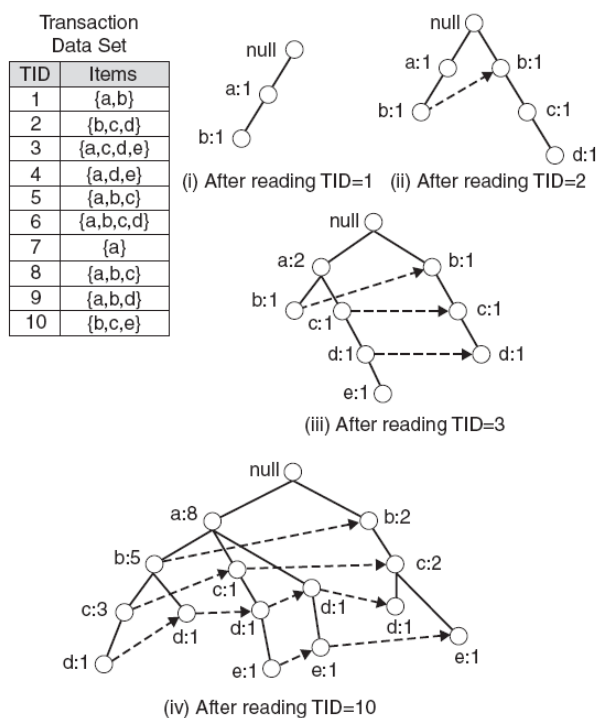


Figure 1.1 . FP Growth Algorithm Example

Determination of Associative Relationships between products and/or services.

Research Flowchart

The research flow can be seen in Figure 1.2 which begins with a literature review and field study and ends with drawing conclusions on the research results.

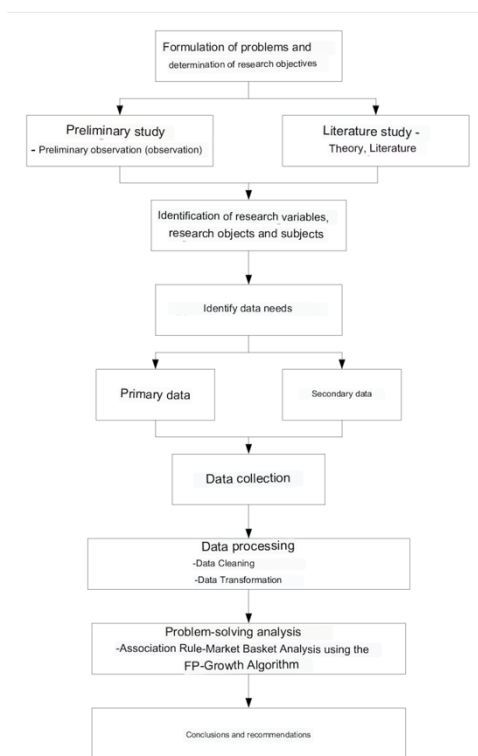


Figure 1. 2. Research Methodology Diagram Block

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Analysis and Evaluation

The analysis contains further discussion of the results obtained from data processing. While the evaluation contains improvements that can be made in order responds to the results of the analysis.

Conclusions and Advice

Conclusions and suggestions are made after analysis and evaluation based on data processing. Some suggestions are aimed at designing policies related to the development of competitiveness.

RESULT

Initial Conditions of the Research Site

Ariana Audy Clinic is famous for its services and relatively affordable prices in all circles. This is evidenced by the high demand for products and services at Ariana Audy Beauty Clinic. However, along with operational time, the procurement of the best-selling goods will run out quickly due to the high demand for these beauty products. And the Beauty Clinic must also be able to order these products so as not to run out of stock and reduce customer satisfaction.

So that in this study, Market Basket Analysis will be carried out to identify products that are often purchased simultaneously using the FP-Growth algorithm which will then be formed into an association rule to be developed as a marketing strategy (Kaur & Kang, 2016) that can be proposed to Ariana Audy Beauty Clinic.

Recapitulation of Transaction Data

In Market basket analysis, the data used is transaction data between consumers and providers of products / services. In this study, the data is represented through a list of consumer transactions on Klink Beauty Ariana Audy. This data is taken from transaction data in December 2022. The total raw data collected is 997 transactions, this raw data will then be cleaned (Data Cleansing) by deleting transaction data that is not in accordance with the data processing criteria in the market basket analysis conducted in this study. The criteria used to eliminate outliers in this raw data are:

- Transaction data must have at least 2 or more items in it
- The same item in the same transaction will count as 1 item.

After the data is cleaned, 146 total transactions are obtained, this data is the main data that will be used in the basketball analysis mockup carried out in this study. The data that has been cleaned is shown in table 1.1.

Table 1.1 Transaction List (Clean Data)

No	Transaction List
1	Oxy Jet Peel, Peeling Spain Acne, Photodynamic therapy
2	Baby Skin Crystal, Sunscreen Niacinamide
3	Peeling Spain Acne, Cream Skin Barrier, Cream Skin Barrier
4	PRP GROWTH FACTOR, Subsisi Salmon, oxy blue cream
5	Laser Whitening, oxgeneo Whitening, Subsisi Salmon
...	...
140	Cauter Wajah, Crystal Peeling
141	Baby crystal peel, Body Serum
142	Hydra, Cream Skin Barrier, Serum Complete, Facial Wash Oily, Brightening Cream
143	Baby Skin Crystal, Sunscreen Brightening, Baby crystal peel
144	PRP GROWTH FACTOR, Laser Co2 Wajah
145	PRP GROWTH FACTOR, Double Laser

145 The data that has been cleaned will then be reprocessed by integrating transaction data and the List of Products and Services at Ariana Audy Beauty Clinic.

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Product and Service Data Recapitulation

In addition to consumer transaction data, the primary data used in this study is data on products and services offered by Ariana Audy Beauty Clinic. The list of products and services at Ariana Audy Beauty Clinic is shown in table 1.2.

Table 1. 2. List of Products and Services of Ariana Audy Beauty Clinic

Kode	Produk dan Jasa	Kode	Produk dan Jasa
1	Acne Mask	49	oxy blue cream
2	Glow Peel masker	50	oxy blue creamblue
3	Gold Mask	51	Cream Skin Barrier
4	masker Mata	52	Skin Care
5	masker wajah	53	Acne Cream Night
6	Micro Derma Dlowing	54	Cream AHA
7	Dana CO2	55	Cream Lipatan
8	Double Laser	56	Derma Roller
9	Laser Co2 Wajah	57	Bright Milky Gluta Soap
10	Laser Leher	58	Acne Care
11	Laser Whitening	59	Acne Care Intensive
12	PRP GROETH FACTOR	60	Anti Acne
13	PRP GROETH FACTOR	61	Sunscreen Acne
14	PRP Premium With Stemcell	62	Baby crystal peel
15	PRP Standard	63	Crystal Peeling
16	booster	64	Glow Peel
17	Skin Booster Korean With Dermashine	65	Glow Peel ACNE
18	Skin Booster plasma with Dermashine	66	Glow Peel ACNE
19	Skin Booster Premium	67	Hollywood Peel
20	Skin Booster Premium	68	Oxy Jet Peel
21	Skin Booster Salmon Blue	69	Peeling Spain Acne
22	Skin Booster Salmon Pink	70	Facial Wash Brightening
23	Cauter Badan	71	Facial Wash Oily
24	Cauter Wajah	72	Milk Cleanser
25	Aquapure	73	meso botox
26	oxgeneo Whitening	74	meso chubby
27	infus baby skin super	75	Meso Mata
28	infus chromosome	76	moist usa
29	infus glow skin	77	Moisturizer
30	Inject Acne	78	Moisturizer FRE
31	Snow White Infusion	79	Subsisi Salmon
32	Blue Toner	80	Subsisi Standart
33	Toner Acne	81	Sunscreen Brightening
34	Toner Blue	82	Sunscreen Everyday
35	Toner Cane	83	Sunscreen Niacinamide

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Kode	Produk dan Jasa	Kode	Produk dan Jasa
36	Body Serum	84	Sunscreen Niacinamide bright ariana
37	Serum Acne Glowing	85	Sunscreen Niacinamide Niacinamide
38	Serum Biolimin C	86	Hydra
39	Serum Blue Booster	87	Photodynamic therapy
40	Serum Complete	88	Total Acne
41	Serum Premium	89	Hollywood
42	Serum Snail	90	Feel US
43	Serum Usa	91	Glubio
44	Brightening Cream	92	Detox
45	Brightening Cream Night	93	Baby Skin Crystal
46	cream malam	94	innoderm
47	everyad	95	Anti Iritasi
48	Night Cream Premium	96	nat c

This list of products and services will then be integrated with consumer transaction data (table. 1.1).

Data Integration and Transformation

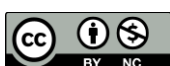
The data processing process carried out in this study used rapid miner software. Before the data processing process is carried out, it is necessary to integrate transaction data and data on products and services offered by the Ariana Audy clinic. This data integration is carried out by transforming the item names on the transaction list (Table 1.1) according to the list of products and services (Table 1.2). The results of data integration and transformation that have been carried out are shown in table 1.3.

Table 1. 3. Data Transformation Recapitulation

No.	1	2	3	4	5	...	92	93	94	95	96
1	0	0	0	0	0	...	0	0	0	0	0
2	0	0	0	0	0	...	0	1	0	0	0
3	0	0	0	0	0	...	0	0	0	0	0
4	0	0	0	0	0	...	0	0	0	0	0
5	0	0	0	0	0	...	0	0	0	0	0
...
141	0	0	0	0	0	...	0	0	0	0	0
142	0	0	0	0	0	...	0	0	0	0	0
143	0	0	0	0	0	...	0	1	0	0	0
144	0	0	0	0	0	...	0	0	0	0	0
145	0	0	0	0	0	...	0	0	0	0	0

The data that has been integrated will then be used in the Market basket analysis process carried out using Rapid Miners Software.

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DISCUSSIONS

ARMBA Model with Rapid Miner

The market basket analysis conducted in this study was conducted to find the association rule of 145 transactions that occurred during December 2022. Data is processed using rapid miner software. At this data processing stage, a Market basket analysis model is built by connecting data with the data processing processes needed (Tatiana & Mikhail, 2018). Starting from determining data attributes, the process of transforming numerical data into binominal to the process of determining association rules formed using FP-growth algorithms.

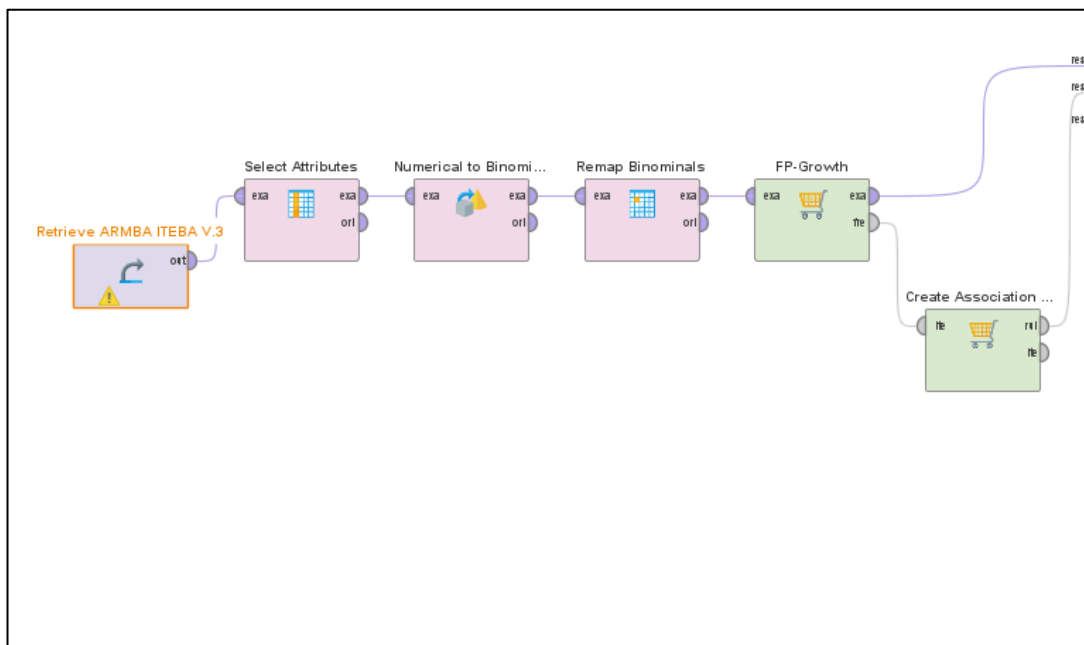


Figure 1. 3 Model Market Basket Analysis with Rapid Miner

The market basket analysis model parameter with rapidminer software used in this study consists of several important components, namely support and confidence (Vyas & Uma, 2018). Support is the percentage of the combination of these items, the support value used in this study is 0.2 or 20%. While confidence (certainty value) is the strong relationship between items in associative rules or can also be said to be the level of intensity of the appearance of an item in a transaction containing an item. The confidence value used in this study is 0.3 or 30%.

Output Rapid Miner

Using a support value of 20% and a confidence value of 30% produces several association rules as shown in figure 1.4.

No.	Premises	Conclusion	Support	Confidence	LaPlace	Gain	p-s	Lift ↑	Conviction
8	93.0	49.0	0.069	0.417	0.917	-0.262	0.028	1.678	1.289
7	44.0	81.0	0.062	0.409	0.922	-0.241	0.042	3.122	1.471
9	81.0	44.0	0.062	0.474	0.939	-0.200	0.042	3.122	1.612
10	87.0	68.0	0.117	0.895	0.988	-0.145	0.102	7.632	8.386
11	68.0	87.0	0.117	1	1	-0.117	0.102	7.632	∞

Figure 1. 4. Market Basket Analysis Results using Rapid Miner

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Based on calculations that have been done using rapid miners, 5 associative rules with lift ratios > 1 were found. Then the 5 associative rules that are formed can be used as a basis for decision making. Each is interpreted as follows:

Item no. 93 (Baby Skin Crystal) will be purchased together with Item no. 49 (Oxy Blue Cream) with a confidence level of 41.7% (0.417) of all transaction data that occurred in December 2022. The lift ratio of this associative rule is 1.678 (lift ratio > 1) so it is concluded that this associative rule is valid.

Item no. 44 (Brighthening Cream) will be purchased together with Item no. 81 (Sunscreen Brighthening) with a confidence level of 40.9% (0.409) of all transaction data that occurred in December 2022. The lift ratio of this associative rule is 3.122 (lift ratio > 1) so it is concluded that this associative rule is valid.

Item no. 81 (Sunscreen Brighthening) will be purchased together with Item no. 44 (Brighthening Cream) with a confidence level of 47.4% (0.474) of all transaction data that occurred in December 2022. The lift ratio of this associative rule is 3.122 (lift ratio > 1) so it is concluded that this associative rule is valid.

Item no. 87 (Photodynamic therapy) will be purchased together with Item no. 68 (Oxy Jet Peel) with a confidence level of 89.5% (0.895) of all transaction data that occurred in December 2022. The lift ratio of this associative rule is 7.632 (lift ratio > 1) so it is concluded that this associative rule is valid.

Item no. 68 (Oxy Jet Peel) will be purchased together with Item no. 87 (Photodynamic therapy) with a confidence level of 100% (1) of all transaction data that occurred in December 2022. The lift ratio of this associative rule is 7.632 (lift ratio > 1) so it is concluded that this associative rule is valid.

Marketing Strategy

The recommended marketing strategy is to provide promotions based on associative rules that are formed, namely by providing promotional packages for the following products and treatment services:

Baby Skin Crystal Products and Oxy Blue Cream Products. Brighthening Cream Products and Brighthening Sunscreen Products. Treatment Services: Oxy Jet Peel and Treatment Services: Photodynamic therapy

CONCLUSION

Based on the results of the Basket Analysis mockup conducted using the FP-Growth algorithm on 145 consumer transaction data at the Ariana Audy Beauty Clinic, 5 associative rules were found, including:

Baby Skin Crystal products will be purchased together with Oxy Blue Cream Products with a confidence level of 41.7% (0.417) and supported by 6.9% (0.069) of all transaction data with a Lift Ratio value in this associative rule of 1.678. Brighthening Cream Products will be purchased together with Brighthening Sunscreen Products with a confidence level of 40.9% (0.409) and supported by 6.2% (0.062) of all transaction data with a Lift Ratio value in this associative rule of 3.122. Brighthening Sunscreen products will be purchased together with Poduk Brighthening Cream with a confidence level of 47.4% (0.474) and supported by 6.2% (0.062) of all data with a Lift Ratio value in this associative rule of 3.122. Treatment Services: Photodynamic therapy will be purchased together with Treatment Services: Oxy Jet Peel with a confidence level of 89.5% (0.895) and supported by 11.7% (0.117) of all transaction data with the value of Lift Ratio in this associative rule is 7.632. Treatment Services: Oxy Jet Peel will be purchased together with Treatment Services: Photodynamic therapy with a confidence level of 100% (1) and supported by 11.7% (0.117) of all transaction data with a Lift Ratio value on this associative rule of 7.632.

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