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An Analysis of Product Bundling Strategy in Internet Service Provider Businesses from the Customer Perspective

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ABSTRAK

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Strategi bundling merupakan pendekatan pemasaran yang menggabungkan beberapa layanan dalam satu paket untuk meningkatkan daya tarik dan loyalitas pelanggan. Namun, masih terdapat kesenjangan antara ekspektasi dan pengalaman pengguna terhadap paket yang ditawarkan. Penelitian ini, bertujuan untuk menganalisis kesesuaian strategi produk bundling yang diterapkan oleh provider internet di Indonesia berdasarkan perspektif pelanggan. Penelitian ini menggunakan metode Market Basket Analysis (MBA) dengan algoritma Apriori untuk mengidentifikasi pola keterkaitan antar layanan berdasarkan data transaksi pelanggan dan hasil survei preferensi. Data diperoleh melalui kuesioner terhadap 385 responden, dengan uji validitas dan reliabilitas menunjukkan hasil yang baik (Cronbach's Alpha = 0.818). Hasil analisis menunjukkan adanya perbedaan signifikan antara pola layanan eksisting yang masih didominasi oleh layanan dasar (telepon, SMS, internet reguler) dan pola harapan pelanggan yang lebih menekankan pada integrasi layanan digital hiburan seperti Netflix, Spotify, Disney+, dan Vidio. Nilai confidence tertinggi (0.95) ditemukan pada asosiasi antara layanan Disney+ dan Spotify terhadap Netflix, menandakan potensi tinggi untuk pengembangan paket berbasis hiburan digital. Hasil ini merekomendasikan pengembangan paket bundling inovatif seperti Ultimate Entertainment (Netflix + Disney+ + Spotify + Internet Unlimited) guna meningkatkan kepuasan dan loyalitas pelanggan.

Keywords :

Apriori Algorithm,
Customer
Satisfaction,
Internet Service
Provider, Market
Basket Analysis,
Product Bundling.

ABSTRACT

Bundling strategy is a marketing approach that combines multiple services into a single package to enhance customer attractiveness and loyalty. However, a gap remains between customer expectations and actual experiences with the offered bundles. This study aims to analyze the suitability of product bundling strategies implemented by internet service providers in Indonesia from the customer perspective. The research applies Market Basket Analysis (MBA) using the Apriori algorithm to identify association patterns among services based on customer transaction data and preference surveys. Data were collected through questionnaires distributed to 385 respondents, with validity and reliability tests indicating satisfactory results (Cronbach's Alpha = 0.818). The analysis reveals a significant difference between existing service patterns, which are still dominated by basic services such as telephone, SMS, and regular internet, and customer expectations that emphasize integrated digital entertainment services, including Netflix, Spotify, Disney+, and Vidio. The highest confidence value (0.95) was identified in the association between Disney+ and Spotify with Netflix, indicating strong potential for digital entertainment-based bundling development. These findings suggest the need for innovative bundling packages, such as Ultimate Entertainment (Netflix + Disney+ + Spotify + Unlimited Internet), to improve customer satisfaction and loyalty.

INTRODUCTION

Product bundling is one of the marketing strategies widely applied by companies to increase sales and enhance product competitiveness. Companies can design bundling packages that combine complementary products, thereby creating more attractive offerings for customers. Through this strategy, companies are able to set more competitive prices compared to purchasing products separately. This is because customers perceive that their needs are fully fulfilled, which encourages them to purchase more items within a single transaction (Memah et al., 2025).

In the telecommunications industry, particularly mobile internet services in Indonesia, almost all service providers implement bundling strategies to attract customers and improve user loyalty. Several examples of bundling packages offered by major internet service providers are presented in Table I.

Table 1. Bundling Packages Offered by Internet Service Providers

No	Provider	Pakage Name	Main Feature
1	Telkomsel	Combo Sakti	Internet + Voice Calls + SMS
2	Indosat O	Freedom Internet	Internet + Selected Applications
3	XL Axiata	Extra Combo Plus	Internet + Applications + Voice Calls
4	Tri (3)	AlwaysOn	Internet + Active Period
5	Smartfren	Unlimited Nonstop	Internet + Night Quota Bonus

Although product bundling strategies offer various benefits to customers, a gap still exists between customer expectations and the actual experiences received by users. Based on a study conducted by Nugraha (2022) on customer satisfaction toward one internet service provider in Indonesia, the obtained Customer Satisfaction Index (CSI) value reached only 74% (Nugraha, 2022). Although this value falls within the “satisfied” category, it indicates a mismatch between customer expectations and the services provided, particularly regarding the offered products. The study found that the customer satisfaction assessment criteria related to product types exhibited a relatively large gap value, approaching 1. A high gap value indicates a significant difference between customer expectations and their actual experiences. These products consist of both bundling and non-bundling products offered by each internet service provider.

Based on the providers listed in Table I, the proportion of bundled products relative to total offerings is as follows: Telkomsel 65%, Indosat Ooredoo 55%, XL Axiata 60%, Tri (3) 60%, and Smartfren 55% (source: respective official provider websites). These percentages indicate that most providers offer a higher proportion of bundled products compared to non-bundled products. Therefore, this study further examines consumer perspectives on bundled products offered by internet service providers. Several key factors contributing to consumer dissatisfaction with bundled products include mismatches between price and perceived benefits, limited quotas for specific applications, and a lack of flexibility in package usage. The researchers assume that providers have not fully implemented a Market-Driven Strategy in determining their bundling offerings, resulting in gaps in customer satisfaction. Consequently, companies need to evaluate their bundling strategies to better align with customer preferences and enhance customer satisfaction and loyalty.

Based on this phenomenon, this study aims to analyze product bundling strategies implemented by internet service providers from the customer perspective to assess the extent to which the offered packages meet user needs. The analysis includes identifying customer preferences in selecting bundling packages. The analytical method employed is Market Basket Analysis, which utilizes customer transaction patterns to identify product pairs that are commonly purchased together (Rizqi, 2022). Given the relatively high gap value in customer satisfaction related to internet product types, a reassessment of bundled products from the customer perspective is necessary. The results of this study are expected to provide alternative bundling products that better align with customer expectations.

Optimizing this strategy has the potential not only to increase customer satisfaction but also to strengthen user loyalty toward the offered services.

LITERATURE VIEW

A. Market Basket Analysis

Market Basket Analysis (MBA) is a data mining method used to identify business patterns for designing more attractive product offerings, increasing cross-selling opportunities, and developing more effective marketing strategies (Atul Sharma et al., 2024). When properly implemented, MBA can generate valuable insights into consumer preferences. In other words, MBA can be applied to understand consumer purchasing behavior through transaction history analysis, thereby supporting businesses in making more effective and data-driven decisions. In the context of marketing strategy, MBA is frequently used to develop product bundling strategies that better align with customer preferences (Sholihin et al., 2025). Previous studies applying the MBA method indicate that MBA is capable of enhancing product offering effectiveness and customer satisfaction through more strategic product arrangement based on consumer purchasing pattern analysis.

B. Apriori Algorithm

The Apriori algorithm is one of the most widely used algorithms for identifying frequent patterns within a dataset. These patterns are determined using two main measures, namely support and confidence (Efori Buulolo, 2019). In association rule mining, three key measures must be considered: support, confidence, and lift ratio. Support represents the frequency of occurrence of a specific item combination within the dataset, while confidence indicates the probability of the occurrence of an item given that another item has already appeared. Meanwhile, the lift ratio is used to evaluate the strength of the relationship between items within an association rule (Badrul, 2016). In the field of data mining, the Apriori algorithm is classified as an association rule mining method, which aims to discover relationships among items in a dataset. The output generated by the algorithm can be utilized as a reference for management in determining appropriate strategic decisions.

a. Support

Support is defined as a measure used to determine the relative frequency of occurrence of a particular item combination within the entire dataset. This value provides an overview of the popularity level of an itemset and serves as an initial indicator in assessing the relevance of the resulting pattern (Pahlevi et al., 2018). A higher support value indicates that the item combination appears more frequently. Based on this measure, the feasibility of an itemset for further analysis can be determined by subsequently calculating its confidence value.

b. Confidence

Confidence is a probabilistic measure that indicates the likelihood of an item (consequent) appearing in a transaction when another item (antecedent) has already appeared. In other words, confidence is used to determine the percentage likelihood that customers will purchase two related items together (Mahardika & Sulianta, 2024).

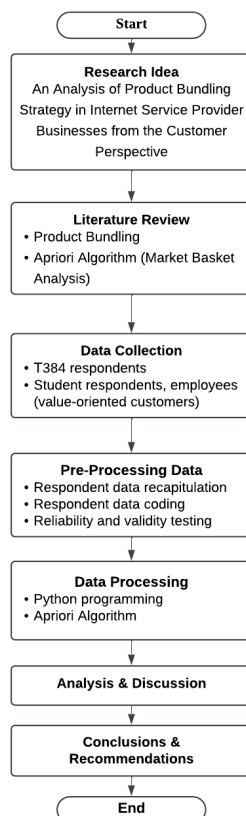
c. Lift

Lift ratio is a metric used to evaluate the strength of an association rule by considering the combination of support and confidence values (Munanda & Monalisa, 2021). This metric also serves as a benchmark for determining the validity of an association rule. Specifically, lift ratio measures how much more likely an item is to be purchased together with another item compared to being purchased independently, and it is used to validate the strength of an association rule. The interpretation of lift values is as follows: when $\text{lift} > 1$, a positive relationship exists, indicating that the occurrence of the antecedent increases the likelihood of the consequent. If $\text{lift} = 1$, there is no specific relationship between the antecedent and the consequent, meaning the association occurs by chance. Conversely, if $\text{lift} < 1$, a negative relationship exists, where the presence of the antecedent reduces the likelihood of the consequent (Rahmi & Mikola, 2021). Therefore, the lift ratio functions as a validation instrument to ensure that the resulting association rules are not only frequent (high support) or consistent (high confidence), but also statistically meaningful and practically relevant in their application.

RESEARCH METHODOLOGY

This study aims to examine the alignment between product bundling offered by internet service providers and customer expectations, as well as to identify suitable bundling packages using the Apriori algorithm. The research flow is visualized in the flowchart shown in Figure 1.

Figure 1. Research Flowchart



1. Literature Study

In this study, the literature review was conducted systematically to strengthen the theoretical foundation and construct a conceptual framework. The first stage involved identifying the main research topic, namely Market Basket Analysis (MBA) using the Apriori algorithm approach. Subsequently, relevant search keywords were derived, including market basket analysis, Apriori algorithm, support, confidence, and lift. Reference searches were then conducted using various credible sources, such as national and international journals, conference proceedings, textbooks, and relevant official websites. The collected references were evaluated and selected based on their relevance to the research topic, the novelty of the studies, and their contribution to supporting the analysis. Selected articles were then categorized according to specific themes, such as fundamental theories of MBA, the concept of the Apriori algorithm, and case studies of its application across various fields. Based on this categorization, a synthesis process was

carried out to obtain a comprehensive overview of previous research developments and to identify research gaps that serve as the foundation for the present study.

2. Operational Definition and Measurement of Variables

Data collection in this study was conducted using a questionnaire distribution method through the Google Form platform, as shown in Figure 2.

Figure 2. Questionnaire on Google Form

Riset Preferensi Konsumen

Halo! 🙋
Kami dari Universitas Internasional Semen Indonesia saat ini sedang melakukan riset "bundling produk" dengan layanan layanan provider internet.

📋 Produk bundling yang kami rencanakan:
Koneksi internet + layanan mobile data
Akses gratis ke aplikasi (tiktok, youtube, instagram, Netflix, dll)
Paket hiburan, hiburan, atau liburan
Akses ke layanan support game, belajar, atau roaming luar negeri

Dengan mengisi survei ini, Anda turut membantu kami mengetahui produk bundling mana yang paling diminati. Menonton atau merekomendasikan produk yang lebih sesuai dengan kebutuhan konsumen. Meningkatkan layanan dan kepuasan pelanggan di sektor telekomunikasi.

🕒 Waktu pengisian: ± 3-5 menit
🔒 Data Anda aman, dengan kerahasiaannya dan hanya untuk keperluan riset.

Terima kasih atas partisipasinya! 🙏
Nah, bantu kami dengan mengisi survei di bawah ini 📝

esi.ugham2@student.uisu.ac.id [Switch account](#)

🚫 Not shared

* Indicates required question

Umur (angka dalam tahun) *

Your answer

Kota domili *

Your answer

Pekerjaan *

☐ Pelajar / Mahasiswa
☐ Karyawan
☐ Other

Jenis Kelamin *

☐ Pria
☐ Wanita

The questionnaire was distributed to a group of respondents consisting of students. This group was selected because it represents the characteristics of value-oriented consumers, namely consumers who tend to consider the balance between price and benefits when making purchasing decisions (Kajol et al., 2025). To determine the required sample size when the total population is not precisely known in quantitative research, this study applied the Lemeshow formula. The calculation results indicated that the minimum required sample size was 384 respondents with a margin of error of 5%. This number was then set as the target number of respondents to ensure that the findings have an adequate level of confidence and are sufficiently representative of the population.

3. Data Pre Processing

The data pre-processing stage consists of a series of steps carried out to ensure data quality before further analysis. This process includes the following stages.

a. Respondent Data Recapitulation

At this stage, data from all respondents who completed the questionnaire through Google Form were recapitulated. From a total of 385 participating respondents, the data were downloaded in spreadsheet format for initial inspection regarding the completeness and consistency of responses.

b. Respondent Data Coding

This stage involved a data coding process aimed at standardizing respondent answers so that they could be processed using data mining algorithms. The coding process began by identifying product variables offered by internet service providers, including Regular Internet, SMS, Voice Calls, YouTube/TikTok/Instagram Quota, Regular Credit, Gaming

Packages, Netflix Subscription, Vidio Subscription, YouTube Premium Subscription, Disney+ Subscription, and Prime Subscription. All variables were then encoded in binary form, where a value of 1 indicates that the respondent selected or used a particular product, while a value of 0 indicates that the respondent did not select the product. The coding scheme is illustrated in Figure 3.

Figure 3. Respondent Data Coding

Transaction Number	Service	Internet Regular	Kuota Belajar	Kuota Youtube, Tiktok, Ig	Langganan Disney+	Langganan Netflix	Langganan Prime	Langganan Spotify	Langganan Vidio	Langganan Youtube Premium	Paket Games	Paket Internet Unlimited	Paket Roaming	Pulsa Regular	SMS	Telepon
1		0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
2		1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
3		1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4		1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
5		1.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
...		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
381		0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
382		1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0
383		0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0
384		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	0.0	1.0
385		1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

383 rows × 15 columns

The data used in this study were divided into two types: existing data and expectation data. Existing data were obtained from customer transaction recapitulation representing actual purchasing patterns. Meanwhile, expectation data were derived from questionnaire results reflecting customer preferences for desired bundling products. Thus, existing data describe current offerings, while expectation data represent customer needs and expectations. Both datasets were then compiled into a final dataset ready to be processed using association rule algorithms. A comparison between existing and expectation data was subsequently conducted to determine the level of alignment between provider bundling packages and customer expectations.

c. Validity Testing

Before further data analysis, instrument testing was conducted to improve the quality of the questionnaire used in this study. Validity testing was performed to measure the extent to which questionnaire items accurately represent the research constructs. This test was conducted using the Pearson Product Moment correlation technique between each item score and the total score. If the correlation value of an item exceeds the critical value (r -table) at a specified significance level, the item is considered valid (Behavior et al., 2022).

d. Reliability Testing

After the instrument was declared valid, the next step was reliability testing to measure

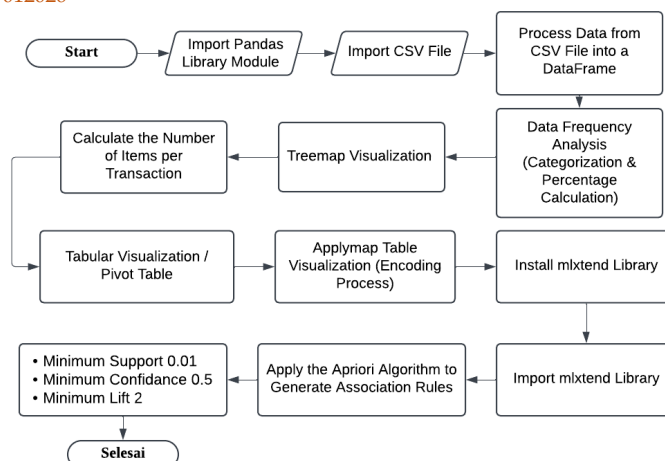
the internal consistency of the questionnaire. Reliability testing was conducted using the Cronbach's Alpha method with the assistance of SPSS software. The research instrument is considered reliable if the Cronbach's Alpha value is greater than 0.70 (Ayu et al., 2019). Through this stage, the research instrument is ensured to be both valid and reliable before proceeding to further analysis.

4. Data Processing

The data processing stage began with importing the Pandas library and a CSV file containing consumer transaction data. The data were then converted into a DataFrame format to facilitate analysis. Next, frequency analysis was performed to determine the percentage selection of each item, which was then visualized using a treemap to display the proportion of the most frequently selected items. The following stage involved calculating the number of items in each transaction and performing data encoding using the `applymap` function to transform the data into binary format (0 and 1), where a value of 1 indicates that an item was selected in a transaction.

After the data were structured, the `mlxtend` library was installed and imported to support the implementation of the Apriori algorithm. The encoded data were then visualized in a pivot table before applying the Apriori algorithm to identify association patterns among consumer purchasing items. In this stage, the minimum parameters used were `support = 0.01`, `confidence = 0.5`, and `lift = 2`. The final output of this process consists of association rules that describe relationships among products frequently purchased together by consumers.

Figure 4. Data Processing Scheme



5. Result and Discussion

This stage includes the process of analyzing and discussing the data that have been collected in the study. The processed data were analyzed in depth to identify patterns and trends relevant to the research focus. The results of the analysis were then discussed comprehensively to address the research problem and achieve the research objective, namely to determine the alignment between bundling packages offered by internet service providers and those desired by customers in Indonesia. Based on these findings, this study also provides strategic recommendations for internet service providers in designing and developing bundling products that better align with customer needs and preferences.

6. Result and Suggestions

This step represents the final stage of the research, which includes drawing conclusions and providing recommendations. The conclusions were formulated based on the results of the analysis and discussion to answer the previously defined research problems. Meanwhile, the recommendations serve as evaluation materials and considerations for relevant stakeholders, as well as references for future studies addressing similar topics, particularly in the development of product bundling strategies for internet service providers in Indonesia.

RESULTS AND DISCUSSION

a. Data Pre Processing

Before conducting the main analysis, this study first performed a reliability test on the questionnaire instrument used to measure existing provider services and expected provider services based on consumer preferences. The reliability test was conducted to ensure that each statement item in the questionnaire had a good level of internal consistency, making it suitable for large-scale data collection. Out of a total of 385 respondents participating in

this study, 30 respondents were randomly selected as samples for reliability testing. This number meets the minimum requirement for reliability testing, as several methodological references suggest that a sample of 25–30 respondents is sufficient to evaluate the internal consistency of an instrument before applying it to the entire population (Putu, 2024). Random sampling was also applied to minimize respondent bias so that the reliability results could represent the general condition of the research data.

Figure 5. Data Reliability Test Results

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.818	30

Based on the reliability test results using the Cronbach's Alpha method, a value of 0.818 was obtained from 30 questionnaire items measuring both existing services and expected services. This value indicates that the research instrument has a high level of reliability. This finding aligns with the general criterion that a Cronbach's Alpha value above 0.70 indicates that an instrument satisfies reliability requirements and can consistently measure the research variables.

b. Implementation of The Apriori Algorithm with Association Rules

Based on the results of the Apriori association analysis of existing services used by internet service provider customers, five associations with the highest confidence values were obtained, forming two main patterns. The first pattern consists of SMS services as the antecedent and voice call services as the consequent, and vice versa, each with a confidence value of 0.114883. This pattern indicates a very strong and bidirectional relationship between SMS and voice call services. In other words, customers who use SMS tend to also use voice call services, and vice versa. This finding reflects the reciprocal relationship between these two basic communication services, which remain an important

part of customer communication behavior despite the rapid growth of digital services.

Table 2. Apriori Association Results of Existing Provider Services

Antecedents	Consequents	Support	Confidence	Lift
(SMS)	(Voice Call Service)	0.174935	0.114883	5.13311
(Voice Call Service)	(SMS)	0.127937	0.114883	5.13311
(Voice Call Service)	(Regular Internet, SMS)	0.101828	0.088773	4.983544
(SMS)	(Regular Internet, Voice Call Service)	0.138381	0.088773	5.014247
(Regular Internet, Voice Call Service)	(SMS)	0.127937	0.088773	5.014247
(Regular Internet, SMS)	(Voice Call Service)	0.174935	0.088773	4.983544
(Unlimited Internet Package, SMS)	(Voice Call Service)	0.174935	0.057441	5.24005
(Voice Call Service, Unlimited Internet Package)	(SMS)	0.127937	0.057441	5.057623
(Voice Call Service, Regular Credit)	(SMS)	0.174935	0.052219	6.253061
(Regular Credit, SMS)	(Voice Call Service)	0.174935	0.052219	4.970798
(YouTube, TikTok, Instagram Quota, SMS)	(Voice Call Service)	0.174935	0.046997	5.716418
(YouTube, TikTok, Instagram Quota, Voice Call Service)	(SMS)	0.169713	0.044386	6.117125
(Education Quota)	(YouTube, TikTok, Instagram Quota)	0.169713	0.033943	4.553147
(Regular Internet, Education Quota)	(YouTube, TikTok, Instagram Quota)	0.169713	0.033943	4.7875
(Education Quota)	(Regular Internet, YouTube, TikTok, Instagram Quota)	0.169713	0.028721	5.143595
(Regular Internet, Netflix Subscription)	(Spotify Subscription)	0.169713	0.028721	8.101923
(Regular Internet, Spotify Subscription)	(Netflix Subscription)	0.169713	0.028721	8.024762
(Game Package)	(YouTube, TikTok, Instagram Quota)	0.169713	0.028721	3.682692
(Voice Call Service, Education Quota)	(YouTube, TikTok, Instagram Quota)	0.169713	0.02611	5.892308

(YouTube, TikTok, Instagram Quota, Education Quota)	(Voice Call Service)	0.169713	0.02611	3.362599
(YouTube, TikTok, Instagram Quota, Education Quota)	(SMS)	0.169713	0.02611	4.138055
(Unlimited Internet Package, Education Quota)	(YouTube, TikTok, Instagram Quota)	0.169713	0.02611	4.820979
(Voice Call Service, Education Quota)	(SMS)	0.169713	0.02611	7.034694
(Education Quota, SMS)	(YouTube, TikTok, Instagram Quota)	0.169713	0.023499	5.303077
(YouTube, TikTok, Instagram Quota, Regular Credit)	(Voice Call Service)	0.169713	0.023499	3.215485
(Education Quota, SMS)	(Voice Call Service)	0.169713	0.023499	5.144776
(Regular Internet, Game Package)	(YouTube, TikTok, Instagram Quota)	0.169713	0.023499	4.285315
(YouTube Premium Subscription)	(Unlimited Internet Package)	0.169713	0.023499	2.157746
(Spotify Subscription, SMS)	(Voice Call Service)	0.169713	0.020888	5.001866
(Regular Internet, Vidio Subscription)	(YouTube, TikTok, Instagram Quota)	0.169713	0.018277	3.437179

Meanwhile, the second pattern group includes voice call services, regular internet, and SMS, which alternately appear as antecedents and consequents with the same confidence value of 0.088773. These patterns indicate an association among voice calls, SMS, and regular internet services that are commonly used together. The results suggest that customers tend not to rely on a single communication service, but rather utilize a combination of basic and digital services. Although the confidence value is slightly lower than that of the first pattern group, this finding shows that regular internet has begun to play a role as a primary complement in customer communication service usage, while SMS and voice calls remain integral parts of an interconnected service ecosystem.

Based on the Apriori association analysis of customer expectation data, five main patterns with the highest confidence values were identified, reflecting customer preferences toward the integration of digital entertainment and communication services. The first pattern consists of Disney+ subscription and Spotify subscription as antecedents and Netflix subscription as the consequent, with a confidence value of 0.95. This result

indicates a very strong association among cross-platform digital entertainment services. Furthermore, the pattern of unlimited internet packages and SMS as antecedents with voice call services as the consequent, with a confidence value of 0.9375, indicates that despite having unlimited data access and messaging services, customers still demonstrate a need for voice-based communication. This finding suggests that voice call services remain relevant as a complement to digital communication.

Table 3. Apriori Association Results of Expected Provider Services

Antecedents	Consequents	Support	Confidence	Lift
(Spotify Subscription, Disney+ Subscription)	(Netflix Subscription)	0.052083	0.95	4.098876
(Unlimited Internet Package, SMS)	(Voice Call Service)	0.083333	0.9375	5.142857
(Vidio Subscription, Spotify Subscription)	(Netflix Subscription)	0.057292	0.909091	3.92237
(Vidio Subscription, Netflix Subscription)	(Spotify Subscription)	0.059896	0.869565	3.838081
(YouTube, TikTok, Instagram Quota, SMS)	(Voice Call Service)	0.085938	0.848485	4.654545
(Education Quota, SMS)	(Voice Call Service)	0.0625	0.833333	4.571429
(Vidio Subscription)	(Netflix Subscription)	0.072917	0.821429	3.544141
(Regular Internet, SMS)	(Voice Call Service)	0.098958	0.815789	4.475188
(Vidio Subscription)	(Spotify Subscription)	0.072917	0.785714	3.46798
(Education Quota, Voice Call Service)	(SMS)	0.067708	0.769231	5.573295
(Disney+ Subscription)	(Spotify Subscription)	0.072917	0.714286	3.152709
(Vidio Subscription)	(Netflix Subscription, Spotify Subscription)	0.072917	0.714286	5.597668
(YouTube, TikTok, Instagram Quota, Voice Call Service)	(SMS)	0.104167	0.7	5.071698
(Regular Internet, Voice Call Service)	(SMS)	0.122396	0.659574	4.778804
(YouTube, TikTok, Instagram Quota, Netflix Subscription)	(Spotify Subscription)	0.098958	0.631579	2.787659
(Unlimited Internet Package, Voice Call Service)	(SMS)	0.125	0.625	4.528302

(SMS)	(Voice Call Service)	0.138021	0.615385	4.554178
(Regular Internet, Netflix Subscription)	(Spotify Subscription)	0.135417	0.615385	2.71618
(YouTube, TikTok, Instagram Quota, Spotify Subscription)	(Netflix Subscription)	0.101562	0.615385	2.655143
(SMS)	(Regular Internet, Voice Call Service)	0.138021	0.584906	4.778804
(SMS)	(Unlimited Internet Package, Voice Call Service)	0.138021	0.566038	4.528302
(Spotify Subscription)	(Netflix Subscription)	0.226562	0.563218	2.430066
(SMS)	(YouTube, TikTok, Instagram Quota, Voice Call Service)	0.138021	0.528302	5.071698
(Regular Internet, Spotify Subscription)	(Netflix Subscription)	0.158854	0.52459	2.2634
(Unlimited Internet Package, Netflix Subscription)	(Spotify Subscription)	0.109375	0.52459	2.732348
(Disney+ Subscription)	(Netflix Subscription)	0.072917	0.52459	3.852327
(YouTube Premium Subscription)	(Netflix Subscription)	0.119792	0.52459	2.344895
(YouTube Premium Subscription)	(Spotify Subscription)	0.119792	0.521739	2.302849
(Netflix Subscription)	(Spotify Subscription)	0.231771	0.127604	2.430066
(Voice Call Service)	(SMS)	0.182292	0.114583	4.554178

The remaining three patterns consist of: (1) Vidio subscription and Spotify subscription as antecedents with Netflix subscription as the consequent (confidence = 0.909091); (2) Vidio subscription and Netflix subscription as antecedents with Spotify subscription as the consequent (confidence = 0.869565); and (3) YouTube, TikTok, Instagram quota, and SMS as antecedents with voice call services as the consequent (confidence = 0.848485). These patterns demonstrate a strong tendency among customers to combine entertainment and communication services. Customers who subscribe to video streaming services are also likely to subscribe to digital music platforms, while social media users continue to exhibit a need for voice call services as a direct communication channel. Overall, these findings indicate a shift in customer behavior toward an integrated digital entertainment ecosystem dominated by services such as Netflix, Vidio, and Spotify,

without eliminating the relevance of conventional services such as SMS and voice calls, which remain essential as communication support tools.

c. Gap Between Existing Data and Expected Data

Gap analysis was conducted to examine the differences between the existing condition of operator bundling services and customer expectations regarding contemporary digital services. The purpose of this analysis is to identify areas that require further development so that bundling strategies become more aligned with consumers' digital lifestyle needs. Five main aspects were analyzed: product dominance, bundling variations, digital added value, consumer tendencies, and bundling strategy. Table 4 presents the comparative gap analysis between existing bundling practices and customer expectations.

Table 4. Gap Analysis of Existing Data and Expected Data

Aspect	Existing Data	Expected Data	Insight
Product Dominance	Almost all consequents represent basic service needs	More diverse consequents: Spotify, Netflix, SMS, Telephone	Customers are actually directed (in expectations) toward digital services (OTT + streaming), but actual patterns remain concentrated on basic services
Bundling Variants	Focus on Quota + SMS & Telephone	Combination of Quota/OTT & OTT + Internet & SMS	There is an opportunity to expand entertainment-based bundling (OTT + quota)
Digital Added Value	Low, as bundling merely shifts quota/SMS to Telephone	High, as bundling involves OTT services (Spotify, Netflix, Disney+)	Operators have not fully optimized digital lifestyle integration despite strong demand
Consumer Tendencies	Customers still strongly use Telephone after having SMS/quota	Customers tend to add digital entertainment services after having quota/other OTT services	There is a behavioral shift from traditional voice communication to digital entertainment consumption
Bundling Strategy	Conservative packages: Internet/SMS/Telephone	Innovative packages: OTT + OTT, Internet + OTT	There is an innovation gap in bundling strategies that needs to be expanded toward entertainment and lifestyle integration

Based on the analysis, existing services are still dominated by basic products such as Telephone, SMS, and regular internet, whereas customers expect more diverse digital content services such as Spotify, Netflix, and other Over-The-Top (OTT) platforms. This indicates that although user trends have shifted toward digital entertainment, operators

have not fully accommodated these evolving demands. This condition demonstrates a mismatch between market direction and product strategies that remain relatively traditional. Therefore, this finding serves as a strategic signal for operators to accelerate the transformation of bundling strategies toward the integration of digital and entertainment services, not merely as complementary features, but as the core value proposition of new service offerings.

d. Bundling Recommendations

Based on the results of the gap analysis and the association patterns derived from customer expectation data, it can be concluded that customers increasingly demonstrate interest in entertainment-based digital services such as Netflix, Spotify, Disney+, and Vidio. The high confidence values (up to 0.95) indicate strong potential for developing bundling strategies that focus not only on basic services but also on integrated digital lifestyles. Accordingly, several strategic recommendations are proposed.

- 1) Ultimate Entertainment Package (Netflix + Disney+ + Spotify + Unlimited Internet Quota)

This combination reflects the highest expectation pattern (confidence = 0.95), where customers tend to subscribe to Netflix after subscribing to Disney+ and Spotify.

- 2) Premium Streaming Combo (Vidio + Netflix + Spotify + Streaming Quota for YouTube and TikTok)

Based on expectation associations, customers who already subscribe to Vidio and Spotify show a strong tendency to add Netflix (confidence = 0.91).

- 3) Music & Chill Package (Spotify + Netflix + Daily Internet Quota)

The strong association among streaming-based entertainment services indicates cross-format content consumption patterns (audio–visual).

- 4) Social Media Plus Package (YouTube + TikTok + Instagram Quota + SMS + Telephone)

The combination with a confidence value of 0.84 indicates that customers who are active on social media still require Telephone and SMS services as complementary communication tools.

- 5) Connected Unlimited Package (Unlimited Internet + OTT Service [Netflix or Disney+] + Telephone)

The association pattern demonstrates strong integration between data service needs and voice services (confidence = 0.9375).

CONCLUSIONS AND SUGGESTIONS

This study demonstrates that the bundling strategies implemented by most internet providers in Indonesia remain focused on basic services such as Telephone, SMS, and regular internet. The results of the Apriori algorithm analysis indicate that the highest association pattern in the existing data occurs between SMS and Telephone services with a confidence value of 0.114883, whereas in the customer expectation data the highest pattern is identified between Disney+ and Spotify toward Netflix with a confidence value reaching 0.95. These findings confirm a shift in customer preferences from conventional communication services toward more integrated digital entertainment services.

Through the gap analysis between existing conditions and customer expectations, it can be concluded that a significant disparity exists between current bundling strategies and actual customer needs. Therefore, internet providers need to transform their bundling strategies by incorporating digital lifestyle elements such as Over-The-Top (OTT) platforms, music streaming, and video streaming services into their service offerings. The recommended packages proposed in this study, such as the Ultimate Entertainment Package and the Premium Streaming Combo, are expected to enhance customer satisfaction and loyalty in the digital era.

REFERENCES

- Atul Sharma, Mohammad Salim Hamidi, & Yousuf Hotak. (2024). Market Basket Analysis Using Machine Learning. *International Journal of Computer Science & Communications (IJCSC)*, 9(1), 14–21. <https://doi.org/10.58885/ijcsc.v09i1.014.as>
- Ayu, D., Bhegawati, S., Ayu, I., Yulastuti, N., Akuntansi, P. S., & Denpasar, U. M. (2019). EFFECT OF PRODUCT INNOVATION AND ENTREPRENEURIAL ORIENTATION ON COMPETITIVE ADVANTAGE IN THE COCONUT SHELL CRAFT INDUSTRY. 4(1), 71–89.
- Badrul, M. (2016). Algoritma Asosiasi Dengan Algoritma Apriori Untuk Analisa Data Penjualan. *Jurnal Pilar Nusa Mandiri*, XII(2), 121–129. <http://ejournal.nusamandiri.ac.id/index.php/pilar/article/view/266>
- Behavior, S., Amalia, R. N., Dianingati, R. S., Farmasi, P. S., & Diponegoro, U. (2022). Pengaruh jumlah responden terhadap hasil uji validitas dan reliabilitas kuesioner pengetahuan dan perilaku swamedikasi. 9–15.
- Efori Buulolo, S. B. (2019). Implementasi Algoritma Apriori Pada Sistem Persediaan Obat (Studi Kasus : Apotik Rumah Sakit Estomihi Medan) Implementasi Algoritma Apriori

Pada Sistem Persediaan Obat (Studi Kasus : Apotik Rumah Sakit Estomihi Medan). Jurnal Teknik Informatika, 4(August 2013), 71–83.

Kajol, L., Darma, S., Artha, M., & Tobing, L. (2025). Pengaruh Harga , Kualitas Produk , dan Tren Terhadap Keputusan Pembelian Thrifting Pada Mahasiswa UHN Medan. 12(1).

Mahardika, R., & Sulianta, F. (2024). Optimalisasi Penjualan Cake melalui Analisis Pola Pembelian dengan Algoritma Apriori. December.

Memah, N. G., Saerang, D. P. E., & Mintalangi, S. S. E. (2025). Penerapan metode cost plus pricing dalam keputusan penentuan harga jual pada pabrik mie rumahan Aneke Emor Desa Tumaratas. Manajemen Bisnis Dan Keuangan Korporat, 3(1), 115–127. <https://doi.org/10.58784/mbkk.290>

Munanda, E., & Monalisa, S. (2021). Penerapan Algoritma Fp-Growth Pada Data Transaksi Penjualan Untuk Penentuan Tataletak. Jurnal Ilmiah Rekayasa Dan Manajemen Sistem Informasi, 7(2), 173–184. <http://ejournal.uin-suska.ac.id/index.php/RMSI/article/view/13253>

Nugraha, D. O. (2022). Analisis Kepuasan Pelanggan Terhadap Kualitaslayanan Internet Dan Harga Produk Providerindosatmenggunakan Metode Customer Satisfactionindex(Csi) Dan Potential Gain Customer Value (Pgcv). 1–18.

Pahlevi, O., Sugandi, A., & Sintawati, I. D. (2018). Penerapan Algoritma Apriori dalam Pengendalian Kualitas Produk. Jurnal & Penelitian Teknik Informatika, 3(1), 272–278.

Putu, S. G. (2024). Menentukan Populasi dan Sampel;Pendekatan Metodology Penelitian Kuantitatif dan Kualitatif. Jurnal Ilmiah Profesi Pendidikan, 9, 2721–2731.

Rahmi, A. N., & Mikola, Y. A. (2021). Implementasi Algoritma Apriori Untuk Menentukan Pola Pembelian Pada Customer (Studi Kasus : Toko Bakoel Sembako). Information System Journal, 4(1), 14–19. <https://jurnal.amikom.ac.id/index.php/infos/article/view/561>

Rizqi, Z. U. (2022). Implementasi Association Rule-Market Basket Analysis dalam Menentukan Strategi Product Bundling pada Usaha Ritel. Performa: Media Ilmiah Teknik Industri, 21(2), 113. <https://doi.org/10.20961/performa.21.2.30156>

Sholihin, M., Sari, P. D., Ikhsan, A., & Rahman, A. (2025). Membangun Dashboard Analisis Perilaku Konsumen dengan pendekatan Market Basket Analysis. RIGGS: Journal of Artificial Intelligence and Digital Business, 4(2), 1379–1386. <https://doi.org/10.31004/riggs.v4i2.662>