Jurnal Riset Multidisiplin Edukasi
https://journal.hasbaedukasi.co.id/index.php/jurmie
Halaman : 28-42

CUSTOMER SEGMENTATION FOR OPTIMIZING MARKETING STRATEGY AT HOTEL PURI MESARI USING THE K-MEANS CLUSTERING METHOD

Ni Kadek Juniawatia[1], Ni Putu Sutramiania[2], Kadek Suar Wibawa[3]
Universitas Udayana Bukit Jimbaran, Bali, Indonesia[1,2,3]
Email: kadekjuniawati@student.unud.ac.id[1], sutramiani@unud.ac.id[2], suar_wibawa@unud.ac.id[3]

Informasi

Volume : 2
Nomor : 6
Bulan : Juni
Tahun : 2025
E-ISSN : 3062-9624

Abstract

Puri Mesari Sanur Hotel faces challenges in maintaining occupancy and customer retention rates, with a retention rate of only 32.44%. This study aims to analyze customer segmentation using the K-Means Clustering algorithm and provide recommendations for effective marketing strategies. The goal is to understand customer characteristics and increase revenue potential amidst intense hospitality industry competition. Hotel reservation data from 2018 to 2024 was analyzed using K-Means Clustering, with validation through Silhouette Score and Elbow Method. The analysis results show three customer clusters: Cluster 0 includes loyal customers with an average of 371 visits and moderate spending; Cluster 1 consists of customers with low visits but diverse national origins; and Cluster 2 is an exclusive segment with the highest spending and longest stay duration. Marketing strategy recommendations were developed using the 4P Marketing Mix, and then the hotel management tested the recommendations by filling out a Likert scale questionnaire to them. As a result, the strategy recommendations for each cluster were found to be appropriate and can be implemented at the hotel to strengthen customer relationships and increase revenue.

Keywords : *Customer Segmentation, K-Means Clustering, Marketing Mix 4P*

Abstrak

Hotel Puri Mesari Sanur menghadapi tantangan dalam mempertahankan tingkat okupansi dan retensi pelanggan, dengan tingkat retensi hanya 32,44%. Penelitian ini bertujuan untuk menganalisis segmentasi pelanggan menggunakan algoritma K-Means Clustering dan memberikan rekomendasi strategi pemasaran yang efektif. Tujuan tersebut adalah untuk memahami karakteristik pelanggan dan meningkatkan potensi pendapatan di tengah persaingan industri perhotelan yang ketat. Data reservasi hotel dari 2018 hingga 2024 dianalisis menggunakan K-Means Clustering, dengan validasi melalui Silhouette Score dan Elbow Method. Hasil analisis menunjukkan tiga cluster pelanggan: Cluster 0 mencakup pelanggan loyal dengan rata-rata 371 kunjungan dan pengeluaran moderat; Cluster 1 terdiri dari pelanggan dengan kunjungan rendah tetapi beragam asal negara; dan Cluster 2 merupakan segmen eksklusif dengan pengeluaran tertinggi dan durasi menginap terpanjang. Rekomendasi strategi pemasaran disusun menggunakan Marketing Mix 4P, lalu pihak manajemen hotel menguji rekomendasi tersebut dengan mengisi kuesioner skala Likert kepada mereka. Hasilnya,

didapatkan rekomendasi strategi bagi setiap cluster yang sudah sesuai dan dapat diterapkan di hotel untuk memperkuat hubungan dengan pelanggan dan meningkatkan pendapatan.

Kata Kunci : *Segmentasi Pelanggan, K-Means Clustering, Marketing Mix 4P*

A. INTRODUCTION

The hospitality industry in Bali is facing significant challenges, particularly in maintaining occupancy rates and customer retention amidst intensifying competition. According to the Bali Hotel Association, hotel occupancy rates in Bali have experienced drastic fluctuations, with a sharp decline during the COVID-19 pandemic, where occupancy figures bottomed out at 20%. With the recovery of the tourism sector, hotels must now adjust their strategies to effectively attract and retain guests. This competitive landscape demands a deeper understanding of customer preferences and behavior, so that marketing efforts can be optimized and hotels can compete more effectively.

Hotel Puri Mesari, located in Sanur, was not spared from this challenge. Despite its strategic location, the hotel experienced a retention rate of only 32.44%, indicating that most of its guests did not return for subsequent visits. This situation emphasized the need for a more targeted marketing strategy that could reach the diverse clientele staying at the hotel. The hotel management realizes that the lack of comprehensive customer data analysis has hindered its ability to effectively tailor services and promotions. To address this challenge, this study proposes the use of K-Means Clustering, a powerful algorithm for customer segmentation. By applying K-Means, Puri Mesari Hotel can categorize its guests based on similar characteristics, such as spending patterns and length of stay. This segmentation enables the development of customized marketing strategies for each cluster, increasing customer engagement and retention.

K-Means Clustering has shown significant results in various applications. In a study by [1], this method successfully segmented customers in the e-commerce sector, leading to improved marketing strategies and an increase in sales of up to 30%. Research by [2]also highlighted the utility of this algorithm in identifying different customer segments based on purchase behavior, allowing managers to improve customer retention and optimize product offerings. In addition, research by [3] showed that K-Means can be applied in sentiment analysis to understand customer preferences on social media, thus assisting companies in formulating more effective communication strategies. Meanwhile, research by [4] discusses

the application of K-Means in inventory management, where the method is used to categorize products based on demand, which contributes to the reduction of operational costs

This research offers novelty by applying K-Means for segmentation in the hospitality industry, an area that has not been previously explored. By using this method, hotel managers can better understand customer demographics and preferences, thus making more informed strategic decisions. The results of this study are expected to add evidence to the effectiveness of K-Means Clustering in optimizing marketing strategies and improving customer experience in the hospitality sector.

The main objective of this research is to analyze customer segmentation at Puri Mesari Hotel using the K-Means Clustering algorithm. The focus of this research is to identify clusters of customers based on their booking behavior and preferences, which will then inform customized marketing strategies. The expected result of this research is customer segmentation that categorizes Hotel Puri Mesari guests into clusters. By utilizing the results obtained from K-Means Clustering, specific marketing strategy recommendations are made to be applied at Puri Mesari Sanur Hotel.

B. RESEARCH METHOD

This study aims to analyze customer segmentation in optimizing marketing strategies at Puri Mesari Sanur Hotel using the K-Means Clustering method. The research process begins with the collection of historical transaction data and customer characteristics, followed by a preprocessing stage to clean the data from irrelevant information. Once the data is ready, the K-Means Clustering algorithm is applied to group customers based on their patterns and preferences. The results of this clustering are then analyzed using the 4P marketing mix framework (Product, Price, Place, Promotion) to develop marketing strategies to be recommended. The research process is illustrated in the attached flowchart as shown in Figure 1, which outlines each stage from data collection, preprocessing, clustering analysis, result evaluation, to marketing strategy development.

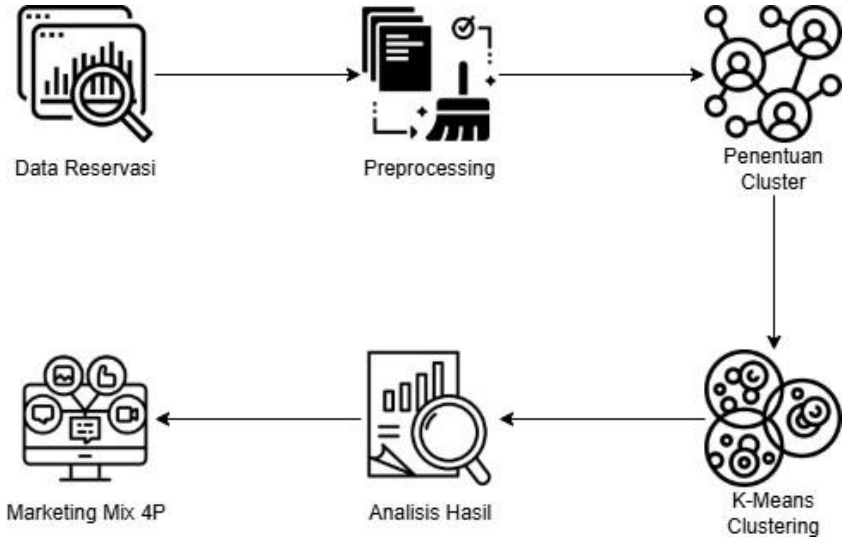

Figure 1. Research Overview

This research started with the collection of reservation data from customer transactions at Puri Mesari Sanur Hotel. The data then went through a preprocessing stage, which included data cleaning to address missing values, duplication, and formatting inconsistencies. Once the data was clean and ready to use, the cluster determination stage was conducted, where the Elbow Method was used to identify the ideal number of clusters. This method helps in determining the most representative number of customer groups based on their reservation patterns. Next, the K-Means Clustering algorithm is used to classify clients according to shared traits, so that a clearer and more structured customer segmentation can be obtained. In order to make the clustering results more valid and accurate, an evaluation using the Silhouette Index is conducted to ensure that the cluster formation is optimal and in accordance with the existing data patterns.

The customer segmentation results obtained are then further analyzed to understand the characteristics and preferences of each customer group. This analysis becomes the basis for formulating a more personalized and targeted marketing strategy. Using the 4P Marketing Mix approach, the marketing strategy designed covers various important aspects. In terms of product, hotel services were developed to better meet the requirements and inclinations of every consumer group. Furthermore, in the aspect of price (Price), adjustments were made to room rates and services based on the purchasing power and spending habits of each customer group. For the Place aspect, the distribution and booking strategy was improved to make it more accessible to customers, both through online and offline platforms. Finally, in terms of

Promotion, a more targeted marketing campaign was implemented to attract the attention of each customer segment more effectively and efficiently.

This data-driven approach is expected to increase customer satisfaction and loyalty, maximize hotel occupancy rates, and strengthen the competitiveness of Puri Mesari Sanur Hotel in the hospitality industry. With a strategy based on data analysis, hotels can be more adaptive to market trends and customer needs, so as to provide better service and increase profits in a sustainable manner.

Literature Study

A literature study is a source that includes information pertaining to the conducted research. This section explores foundational concepts and previous studies relevant to customer segmentation using the K- Means Clustering algorithm and the implementation of the Marketing Mix (4P) strategy. This review is structured to provide clarity on the techniques, evaluation metrics, and algorithmic decisions specific to customer segmentation and marketing strategy within the hospitality industry.

Customer Segmentation

Customer segmentation is a strategy where companies divide diverse markets into smaller groups of customers with similar characteristics, needs, and behaviors. The goal is to develop more effective and efficient marketing strategies by tailoring offers and messages to the characteristics of each segment. Segmenting allows companies to focus resources on the most potential customers, improve satisfaction and loyalty, and identify new market opportunities [5]. By understanding the needs and preferences of each segment, companies can enhance customer satisfaction and loyalty through more relevant product and service offerings. Additionally, segmentation helps companies identify untapped market opportunities and develop strategies to reach unexplored customer segments [6].

Clustering

Clustering is a essential technique in machine learning that involves grouping data objects into clusters based on similarity. This unsupervised learning method aims to identify meaningful patterns in data by grouping similar objects together while ensuring high dissimilarity between clusters [7]. The clustering process is crucial for understanding data distribution, detecting anomalies, and identifying key features in datasets [8].

K-Means Algorithm

One of the most widely used clustering techniques is K-Means. K-Means used to group data intoκ clusters based on similarity. It minimizes intra-cluster variance while maximizing inter-cluster variance [4]. The steps in the K-Means algorithm include initializingκ centroids, calculating distances using Euclidean metrics, assigning data points to the nearest centroid, recalculating centroid positions, and iterating until convergence [9]. The mathematical formulation for calculating the distance between data points and centroids is:

$$d(x, c) = \sqrt{\sum_{i=1}^{n} (x_1 - c_i)^2}$$

where *d(x,c)* represents the distance between data point *x* and centroid *c, x_i* is the *i-th* feature value, *c_i* is the *i-th* feature value of the centroid, and *n* is the number of dimensions [9]. The objective function for minimizing intra-cluster variance is:

$$J = \sum_{i=1}^{k} \sum_{x_i \in S_j} ||x_i - c_j||^2$$

where *J* measures the within-cluster sum of squares, *k* is the number of clusters, *x_i* is a data point, and *c_j* is the centroid of cluster *j [9]*.

4P Marketing Mix

The Marketing Mix framework consists of four elements: Product, Price, Place, and Promotion. Each element contributes to the development of an effective marketing strategy tailored to specific market segments [10].

- *Product*: Refers to the offerings (goods, services, utilities) designed to satisfy customer needs. Attributes include quality, features, style, design, variety, branding, packaging, size, services, and return policies [11].
- *Price*: Represents the monetary value customers exchange for products, influenced by affordability, quality, competitiveness, and perceived benefits [11].
- *Place*: Encompasses distribution channels, including direct sales (retail, e-commerce) and intermediaries (wholesalers, retailers) [12].
- *Promotion*: Involves communication strategies like sales promotions, public relations, direct marketing, advertising, and personal selling [13].

Integration of K-Means and Marketing Mix

Combining K-Means clustering with the Marketing Mix framework provides a robust approach to understanding and addressing customer needs. By identifying customer segments, businesses can tailor their offerings, pricing strategies, distribution channels, and

promotional campaigns to resonate with each segment [13]. This integration has proven effective in various industries, although its application in hospitality remains underexplored [14].

C. RESULT AND DISCUSSION

4P Marketing Mix

The Marketing Mix framework consists of four elements: Product, Price, Place, and Promotion. Each element contributes to the development of an effective marketing strategy tailored to specific market segments [10].

- *Product*: Refers to the offerings (goods, services, utilities) designed to satisfy customer needs. Attributes include quality, features, style, design, variety, branding, packaging, size, services, and return policies [11].
- *Price*: Represents the monetary value customers exchange for products, influenced by affordability, quality, competitiveness, and perceived benefits [11].
- *Place*: Encompasses distribution channels, including direct sales (retail, e-commerce) and intermediaries (wholesalers, retailers) [12].
- *Promotion*: Involves communication strategies like sales promotions, public relations, direct marketing, advertising, and personal selling [13].

Integration of K-Means and Marketing Mix

Combining K-Means clustering with the Marketing Mix framework provides a robust approach to understanding and addressing customer needs. By identifying customer segments, businesses can tailor their offerings, pricing strategies, distribution channels, and promotional campaigns to resonate with each segment [13]. This integration has proven effective in various industries, although its application in hospitality remains underexplored [14].

Result and Discussion

In this section, the results of the data analysis that has been carried out will be presented as well as discussions related to the findings. The main analysis involves the application of the K-Means Clustering algorithm for customer segmentation of Puri Mesari Hotel, followed by the design of Marketing Mix (4P) strategies tailored for each identified segment.

K-Means Clustering

The implementation step of the K-Means Clustering algorithm consists of two main stages: determining the optimal number of clusters and implementing clustering. The determination of the optimal number of clusters is done through the Elbow and Silhouette Score methods.

Table 4.1 Silhoutte Score Results

Silhoutte Score for K=2	0.5401
Silhoutte Score for K=3	0.6526
Silhoutte Score for K=4	0.6095
Silhoutte Score for K=5	0.6111
Silhoutte Score for K=6	0.5673
Silhoutte Score for K=7	0.5600
Silhoutte Score for K=8	0.5756
Silhoutte Score for K=9	0.5283
Silhoutte Score for K=10	0.5291

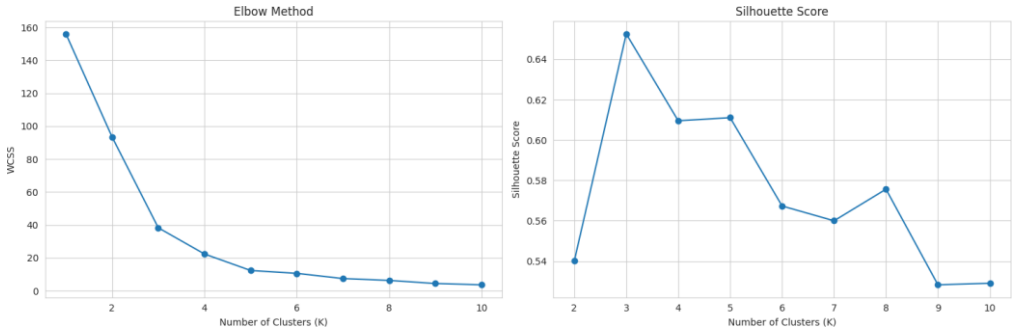

Figure 4.1 Comparison Chart of Elbow Method and Silhoutte Score

From the analysis, the optimal number of clusters is 3 (K=3). The Silhouette Score method shows the highest value of 0.653 at K=3, indicating the best clustering quality with good internal cohesion and separation between clusters. With the optimal number of clusters (K=3), the clustering process is carried out using the K-Means algorithm. Customer data was divided into three clusters based on the characteristics of total visits, average length of stay, and average total payment.

```
Cluster 0
    Country  total_visits  avg_room_nights  avg_final_amount  Cluster
2   Austria             4        12.250000      1.247646e+07        0
14   Greece             6         7.666667      5.323398e+06        0
15  Hungary             8         5.625000      4.797288e+06        0
19  Ireland             1         8.000000      8.640000e+06        0
27  Morocco             2         6.000000      6.747980e+06        0
34   Russia            32         5.937500      4.502732e+06        0
36   Serbia             1         7.000000      6.548400e+06        0
```

Figure 4.2 Cluster 0 Results

Cluster 1

	Country	total_visits	avg_room_nights	avg_final_amount	Cluster
0	Armenia	1	2.000000	1.237104e+06	1
3	Belgium	17	2.823529	2.290870e+06	1
4	Brazil	6	3.500000	3.383857e+06	1
5	Canada	5	3.200000	3.460831e+06	1
7	Czech Republic	3	2.000000	2.132000e+06	1
8	Czechia	2	1.000000	8.529750e+05	1
9	Denmark	8	3.875000	3.895684e+06	1
10	Egypt	1	2.000000	1.173480e+06	1
11	Finland	1	2.000000	1.346400e+06	1
16	India	11	2.000000	1.699932e+06	1
18	Iran	2	2.000000	1.365656e+06	1
20	Israel	2	1.000000	1.029330e+06	1
21	Italy	20	1.800000	1.495384e+06	1
23	Lebanon	1	1.000000	7.591480e+05	1
24	Malaysia	3	4.000000	3.483303e+06	1
25	Malta	1	2.000000	2.160000e+06	1
26	Mexico	1	2.000000	2.146500e+06	1
29	New Zealand	1	4.000000	5.095200e+06	1
30	Norway	1	2.000000	1.785000e+06	1
31	Pakistan	1	2.000000	1.980000e+06	1
32	Poland	17	3.764706	3.337640e+06	1
33	Romania	3	2.000000	1.311600e+06	1
35	Saudi Arabia	2	2.500000	2.581200e+06	1
38	Slovakia	3	4.666667	3.721017e+06	1
39	Slovenia	1	2.000000	1.477440e+06	1
40	South Africa	6	2.000000	1.425078e+06	1
41	South Korea	17	2.235294	2.117984e+06	1
42	Spain	13	2.461538	1.987132e+06	1
43	Sweden	10	3.600000	2.939699e+06	1
44	Switzerland	5	3.000000	2.063042e+06	1
45	Taiwan	5	2.200000	1.614324e+06	1
46	Thailand	1	2.000000	1.784286e+06	1
47	Turkey	3	2.333333	1.997680e+06	1
48	UAE	1	1.000000	9.240000e+05	1
51	Ukraine	3	1.333333	8.926450e+05	1

Cluster 2

	Country	total_visits	avg_room_nights	avg_final_amount	Cluster
1	Australia	259	4.185328	4.176968e+06	2
6	China	163	3.631902	3.639304e+06	2
12	France	246	3.491870	3.506019e+06	2
13	Germany	331	3.833837	3.709657e+06	2
17	Indonesia	362	3.958564	3.873345e+06	2
22	Japan	219	4.109589	4.103821e+06	2
28	Netherlands	299	3.826087	3.642222e+06	2
37	Singapore	134	3.925373	3.878947e+06	2
49	UK	340	4.023529	3.852660e+06	2
50	USA	354	4.107345	3.913756e+06	2

Figure 4.3 Cluster 1 Results

Figure 4.4 Cluster 2 Results

The clustering results show a clear division between three groups of countries. Cluster 0 consists of 7 countries characterized by medium to high visitation (1-32 visits) and relatively high average nights stayed (5-12 nights). Cluster 1 is the largest group with 35 countries,

characterized by a low number of visits (majority 1-20 visits) and low average nights stayed (1-4 nights). Meanwhile, Cluster 2 consists of 10 countries with a very high number of visits (>100 visits) and moderate average nights stayed (3-4 nights). This group includes major countries such as USA, UK, Australia, and China. Visualization of clustering results is done through several techniques as follows:

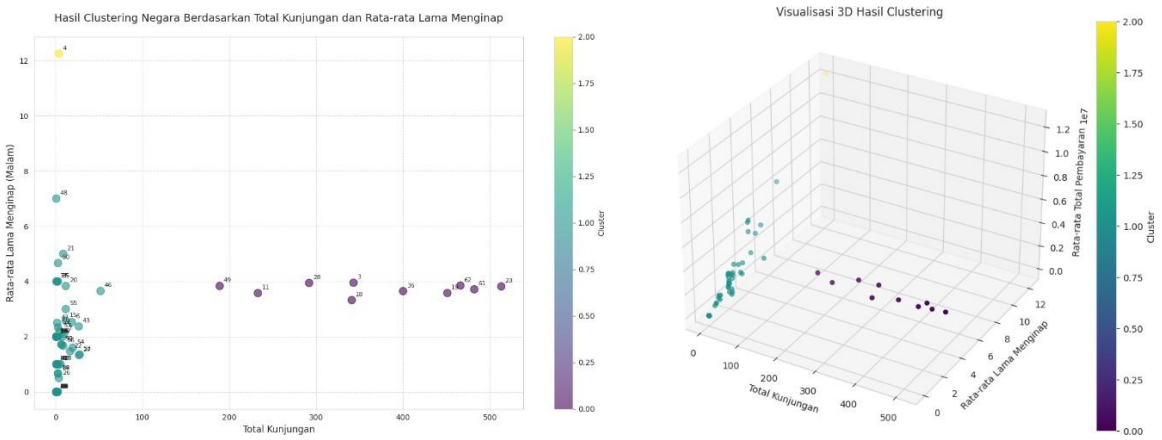

Figure 4.5 2D and 3D Visualization

The 2D and 3D Scatter Plot displays the clustering pattern of countries based on total visits, average length of stay, and average total payments. There is a clear difference in characteristics between clusters. This visualization strengthens the clustering results and provides a clear picture of the characteristics of each customer segment, which can be used as a reference in making strategic marketing decisions for Puri Mesari Hotel.

Customer Segmentation Analysis

In this part, we will talk about the results of the customer segmentation analysis that has been carried out using the *clustering* method. This analysis aims to group countries based on their tourist visit characteristics, so as to provide a better understanding of the behavior patterns of tourists from different countries.

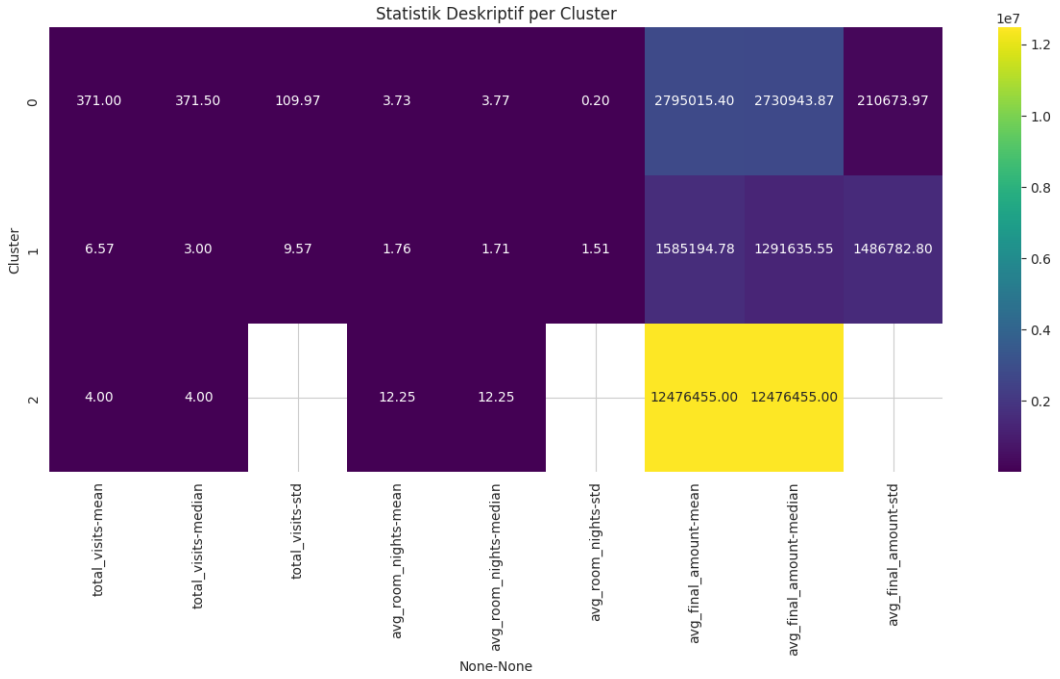

Figure 4.7 Descriptive Statistics per Cluster

Based on the descriptive statistics shown, each cluster has different characteristics in terms of visits, length of stay, and tourist expenditure. Cluster 0 has an average visit of 371 visits with a median of 371.5, and a standard deviation of 109.97. The average length of stay in Cluster 0 is 3.73 nights with a median of 3.77 nights and a standard deviation of 0.20. The average expenditure of tourists in this cluster reached 2,795,015.40 with a median of 2,730,943.87 and a standard deviation of 210,673.97. For Cluster 1, the average visit is lower at around 6.57 visits with a median of 3.00 and a standard deviation of 9.57. The average length of stay in this cluster is 1.76 nights with a median of 1.71 nights and a standard deviation of 1.51. The average expenditure of tourists in Cluster 1 is 1,585,194.78 with a median of 1,291,635.55 and a standard deviation of 1,486,782.80. Meanwhile, Cluster 2 shows different characteristics with an average visit of 4.00 (median 4.00) and a standard deviation of 12.25. The average length of stay in this cluster is also 12.25 nights. Interestingly, the average expenditure in Cluster 2 is much higher than the other clusters, reaching 12,476,455.00. These differences in characteristics indicate significant variations in visitation patterns, length of stay, and tourist expenditure in each cluster, which can serve as a basis for the development of more targeted service strategies.

Characteristics	Cluster 0	Cluster 1	Cluster 2
Number of Countrie	Medium	Most	Least

s			
Visiting Pattern	371 visits (Highest)	6.57 visits (Low)	4 visits (Lowest)
Duration of Stay	3.73 pm (Intermediate)	1.76 nights (Shortest)	12.25 p.m. (Longest)
Spending Pattern	IDR 2,795,015 (Medium)	IDR 1,585,194 (Lowest)	IDR 12,476,455 (Highest)

Table 4.2 Comparison between Clusters

From the analysis of the table above, the three clusters show different characteristics: Cluster 1 has the widest geographical reach with the largest number of countries, but shows low performance in other aspects. The average visit is only 6.57 times, the duration of stay is short (1.76 nights), and the spending is the lowest (IDR 1,585,194). Cluster 0 is the stable "middle" group. It recorded the highest number of visits (371 visits), with a stay duration of 3.73 nights and a medium spend of IDR 2,795,015. Cluster 2 is the group with the least number of countries and the lowest visits (4 visits), but excels in duration of stay (12.25 nights) and spend (IDR 12,476,455). This cluster represents travelers with high economic value despite their low quantity.

Marketing Strategy Recommendations

Based on the results of the analysis using the K-Means Clustering method that has produced three clusters with different characteristics, this research develops marketing strategy recommendations using the 4P Marketing Mix framework (Product, Price, Place, Promotion). These recommendations are developed specifically for each customer segment by considering the unique characteristics that have been identified through clustering analysis.

For the Regular/Mid-range Segment (Cluster 0), strategies are focused on offering 3-4 night stay packages that suit their visit patterns, providing standard plus amenities such as free Wi-Fi and breakfast, and loyalty points programs to increase customer retention. Competitive mid-range pricing strategies, early bird booking offers, and payment flexibility were also prioritized to attract this segment. Distribution through a combination of OTA (Online Travel Agent) and direct booking is supported by active promotion through social media and email marketing, as well as bundling programs with strategic partners such as restaurants or local tourism activity providers.

For the Premium Segment (Cluster 1), recommendations include offering 4-5 night premium stay packages, personalized services such as special welcome or small gifts, as well

as exclusive access to premium facilities that can enhance customer satisfaction. Premium pricing that reflects the value of the service, member-only benefits programs, and selective room upgrade schemes are part of the strategy designed to increase loyalty and revenue from this segment. Distribution is directed through partnerships with premium travel agents and presence on exclusive booking platforms, while promotions are focused on exclusive membership programs, personalized direct marketing, and organizing special events that suit the lifestyle of premium customers.

Meanwhile, for the Economical Segment (Cluster 2), marketing strategies are focused on offering efficient 2-3 night stay packages, standardizing basic facilities that meet customer expectations, as well as value-added services programs such as discounts for local tourism activities. Competitive pricing strategies, low season discounts, and special rates for group bookings are prioritized to attract this segment. Distribution through cooperation with OTAs, direct booking channels with special promos, and marketplace utilization are optimized to reach price-sensitive markets. Promotion is done through referral programs, cost-effective digital marketing, and bundling packages with transportation to provide added value. By aligning these marketing strategies with the unique characteristics of each segment, hotels can increase marketing effectiveness, customer loyalty, as well as competitiveness in the competitive hospitality market.

D. CONCLUSION

This research shows that customer segmentation plays an important role in the marketing strategy of Puri Mesari Hotel. The application of the K-Means Clustering algorithm with Elbow Method and Silhouette Score evaluation resulted in three optimal clusters with a Silhouette Score value of 0.653. Each cluster has unique characteristics, which are the basis for designing marketing strategies based on the 4P Marketing Mix. The proposed strategies include loyalty programs and competitive pricing for customers with moderate stay duration, exclusive marketing for premium customers, and value-based promotions for high spending groups. The results of this study not only provide insight into customer behavior patterns, but also offer practical strategies that can improve hotel competitiveness. Going forward, there is a need to develop a more comprehensive data-based segmentation system, periodic evaluation of marketing strategies, and increased focus on the premium segment to maximize revenue potential.

E. REFERENCES

K. Tabianan, S. Velu, and V. Ravi, "K-Means Clustering Approach for Intelligent Customer Segmentation Using Customer Purchase Behavior Data," Sustainability (Switzerland), vol. 14, no. 12, pp. 1–15, 2022, doi: 10.3390/su14127243.

S. F. Djun, REKOMENDASI PENDAMPINGAN BISNIS UMKM BERDASARKAN HASIL SEGMENTASI PELANGGAN MENGGUNAKAN K-MEANS CLUSTERING PADA MODEL ….

repo.undiksha.ac.id, 2024. [Online]. Available: https://repo.undiksha.ac.id/id/eprint/20204

A. G. Ramadhan, "DATA MINING UNTUK SEGMENTASI PELANGGAN DENGAN ALGORITMA K-MEANS: STUDI KASUS PADA DATA PELANGGAN DI TOKO RETAIL,"

Jurnal Ilmiah Indonesia, vol. 8, no. 1, pp. 5698–5715, 2023, doi: http://dx.doi.org/10.36418/syntax-literate.v6i6.

V. K. Tan, Pang-Ning, Michael Steinbach, Introduction to Data Mining. 2014. doi: 10.1016/b978-155558242-5/50003-6.

S. J. Shaw and K. R. Davis, Marketing Management, vol. 37, no. 1. 1973. doi: 10.2307/1250781.

Wendell R . Smith, "Product Differentiation and Market Segmentation as Alternative Marketing Strategies Author (s): Wendell R . Smith Published by : American Marketing Association Stable URL : http://www.jstor.org/stable/1247695 PRODUCT DIFFERENTIATION AND MARKET SEGMENTAT," American Marketing Association, vol. 21, no. 1, pp. 3–8, 1956.

V. Kumar, Data Clustering : Algorithms and Applications. 2014. doi: 10.1201/9781315373515- 4.

https://revou.co/kosakata/clustering, diakses pada 21 Januari 2025

V. Alvianatinova, I. Ali, N. Rahaningsih, and A. Bahtiar, "Penerapan Algoritma K-Means Clustering Dalam Pengelompokan Data Penjualan Supermarket Berdasarkan Cabang (Branch)," JATI (Jurnal Mahasiswa Teknik Informatika), vol. 8, no. 2, pp. 1529–1535, 2024, doi: 10.36040/jati.v8i2.8993.

P. Mir and P. Mir-Bernal, "the Ultimate Theory of the Marketing Mix: a Proposal for Marketers and Managers," International Journal of Entrepreneurship, vol. 26, no. 1, 2022, [Online].

Available: https://www.researchgate.net/publication/360075989

E. Hendrayani et al., "Konsep Bauran Pemasaran 4P dan 7P," Manajemen Pemasaran: Dasar dan Konsep, no. June, p. 126, 2021.

Alimah Nur and Atik Lusia, "Pengaruh Strategi Marketing Mix (4P) Dalam Upaya Meningkatkan Kinerja Pemasaran Pada Masa Pandemi Covid-19 (Studi Kasus Pada Geffa Production Sukoharjo)," Jurnal Sinar Manajemen, vol. 10, no. 2, pp. 102–115, 2023, doi:

10.56338/jsm.v11i2.2821.

H. O.C, Ferrel , Michael D, Marketing_Strategy, 6th ed., vol. 6, no. 1. 2019. [Online]. Available: http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_SISTEM_PEMBETUNGAN_TERPU SAT_STRATEGI_MELESTARI

R. Wu, "Behavioral analysis of electricity consumption characteristics for customer groups using the k-means algorithm," Systems and Soft Computing, vol. 6, no. April, p. 200143, 2024, doi: 10.1016/j.sasc.2024.200143.

Ramadhan, A. G. (2023). DATA MINING UNTUK SEGMENTASI PELANGGAN DENGAN ALGORITMA K-MEANS: STUDI KASUS PADA DATA PELANGGAN DI TOKO RETAIL. Jurnal Ilmiah Indonesia, 8(1), 5698–5715. https://doi.org/http://dx.doi.org/10.36418/syntaxliterate.v6i6