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Customer Loyalty Analysis Online Shop Typical of Labuan Bajo Souvenirs With RFM Model And K-means Cluster

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Abstract

A typical Labuan Bajo souvenir shop is a shop that sells various types of typical Labuan Bajo souvenirs. In the sales process, this shop still uses manual methods, such as using the telephone or WhatsApp to get in touch with customers who place orders, other than that typical souvenir shops. Labuan Bajo wants to apply the right marketing strategy to increase sales. With the problem, a system is needed that can automatically manage customers. Recency, Frequency, and Monetary are methods that are often used in assigning values or weights to customers from the transaction process. The results of the weighting will be analyzed and grouped by k-means. The typical Labuan Bajo souvenir had 1 regular customer, 3 potential customers, and 6 regular customers, according to grouping results from the previous three months. Testing was then conducted using data obtained from the system's features, and it was determined that the system had been functioning as intended. Well, it may aid the normal Labuan Bajo gift shop in its sales endeavors.

Keywords: Online Shop, RFM, K-Means, Customer Segmentation.

1. INTRODUCTION

A store selling a variety of Labuan Bajo-specific souvenirs is known as a souvenir shop. The issue of WhatsApp messages stacking at the gift store results in several problems during order recording. Additionally, having the appropriate marketing plan is essential to thrive, compete, and forge partnerships with clients in the increasingly fierce market for traditional Labuan Bajo souvenirs [1]. Making a computer system that links buyers and sellers is one approach that may be used to address these issues. This will make it simpler for buyers to place orders and for merchants to record order information. This system uses the Recency, Frequency, and Monetary (RFM) method to evaluate prior customer orders up until a dataset is generated and utilized as the basis for clustering. Using the K-means algorithm. Identifying the target market in the group and offering the right special discounts to pique consumers' interest in making purchases is possible.

RFM is a method currently used to obtain data with the same category regarding recency, frequency, and purchase price (monetary) [2]. RFM provides a tool to observe a range of clients [3]. The distance a buyer traveled most recently to purchase in the past day, week, or year is referred to as recency. Whether or not customers often complete transactions for purchases is connected to frequency. Money spent by a consumer to complete a transaction for a purchase is referred to as monetary [4].

Similar research has been done in the past to find potential and dedicated customers by segmenting customers using the RFM and K-Means models to uncover traits suitable for customer segmentation. Another organization has also conducted further research to identify client segments with high customer loyalty and profitability levels. Data analysis is the first step in segmentation, followed by LRFM (Length, Recency, Frequency, Monetary) transformation and Fuzzy C-Means classification [6]. By identifying the traits of each individual, the RFM approach is utilized in a case study at PT Coversuper Indonesia Global to segment the market and provide data that can be used to assist businesses in better understanding their target audiences and developing targeted marketing strategies [7]. According to a similar study, the RFM approach can help retail business managers determine how many clothing products need to be restocked depending on the date, color, size, and overall revenue of transactions [8].

2. METHODS

The study will take place at a typical Labuan Bajo gift shop in the East Nusa Tenggara city of Bajo, in the West Manggarai region. The latest three months of store transaction data, from July to September 2022, are used in this analysis. The software used in this study included the Windows 10 operating system, Google Chrome, Visul Studio, and XAMPP, a program that offers several different devices in one package, including Apache (Web Server), PHP (ServerSide Scripting), Mysql (Database), PhpMyAdmin, Perl FTP server, and others [9]. The hardware includes an AMD 3020e laptop with Radeon Graphics 1.20 GHz and RM 8 GB of memory.

The study was carried out in stages, including the problem identification stage, which involved literature reviews, a literature review matrix system, and a research journal matrix, the data collection stage, which involved interviews and documentation, the data management stage, which involved selection, preprocessing, and clustering, the design stage, which included system analysis and system design, the implementation stage, which involved coding, and the testing stage using the b consist of three steps: testing the case specification, running the test case, and managing and reporting the test results [10].

2.1. Customer Data Management

The initial stage in handling research data is to create a collection of transaction criteria patterns based on the recency, frequency, and monetary (RFM) model. The datasets for the most recent three months' worth of sales transaction data are presented in Table 1.

Table 1. Sales Transaction Data

IDs	Recency	Frequency	Monetary
Modoku	28	3	Rp 1.200.000
Labuan Square	9	Missing ", "	Rp 8.400.000
Bajo Bakery	17	14	Rp 6.300.000
Theresa	1	4	Rp 3.000.000
Surya Agung	14	27	Rp 10.500.000
Kado Bajo	22	9	Rp 5.200.000
Denis Mart	21	Missing ", "	Rp 6.820.000
Exotic Komod	7	32	Rp 13.120.000
Ayana Komod Resort	12	18	Rp 7.000.000
Artomoro	32	7	Rp 8.650.000

The next stage is to extract data with the properties required to quantify the peaks and troughs of client loyalty based on recent, frequent, and financial trends. A weighted method between the ranges of 1 and 5 will be utilized to provide loyalty ratings, with 5 denoting "Very Satisfied," 4 "Satisfied," 3 "Ordinary," 2 "Less Satisfied," and 1 "Not Satisfied." The results of this weighting will serve as the foundational dataset for the K-Means customer categorization algorithm. Table 2 lists the consumer criteria that were determined via the RFM Analysis. The next stage is to extract data with the properties required to quantify the peaks and troughs of client loyalty based on recent, frequent, and financial trends. A weighted method between the ranges of 1 and 5 will be utilized to provide loyalty ratings, with 5 denoting "Very Satisfied," 4 "Satisfied," 3 "Ordinary," 2 "Less Satisfied," and 1 "Not Satisfied." The results of this weighting will serve as the foundational dataset for the K-Means customer categorization algorithm. Table 2 lists the consumer criteria that were determined via the RFM Analysis.

Table 2. Customer Criteria

No	Criteria	Recency (Hari)	Frequency (Transaksi/Bulan)	Monetary (Rp/month)
1	Regular Customers	1-7	29-32	>10.736.000
2	Potential Customers	8-14	21-26	8.352.000 – 10.735.999

3	Customers	>15	<20	<8.351.999
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2.2. Clustering Stage

Using the K-Means technique (K=3), the step tries to divide consumers into three loyalty groups and identify the first centroid of the collected data. We kept going with the distance calculation using the Euclidean Distance formula, which determines the size of the potential distance between two separate variables [11].

$$d(x_i, x_j) = \sqrt{\sum_{l=1}^n (x_{il} - x_{jl})^2} \tag{1}$$

After the Euclidean Distance value is known, it can be known the value of C1, C2, and C3, which is the closest distance to each data object with a cluster value of 1, 2, 3. Then determine the closest distance of an object to a Centroid point using the minimum value formula between C1 and C2 with C3. The calculation can be continued to the 2nd iteration process by determining the value of the new centroid point by calculating the average of each cluster using the following equation.

$$c_{kl} \tag{2}$$

This calculation process is carried out repeatedly until it is found that the result of the iteration is the same as the previous iteration and in that condition, the calculation can be stopped because the cluster condition has reached convergence. Cluster 3 with the status of "Very Loyal" has the number 1, Cluster 2 with the status of "Loyal" has the number, and Cluster 1 with the status of "Ordinary" has a total of 6 pieces. These are the findings of the cluster computation.

2.3. System Design

System design includes analysis of functional and non-functional needs. Details of functional needs are found in Tables 3 and 4 for non-functional.

Table 3. Functional Needs

ID	Functional Needs
UR-001	Users can register and login on to the website
UR-002	Users can select and access the home menu, order menu, and several Toneneus displayed
AD-001	Admins can login on to the admin page
AD-002	Admins can manage websites

- AD-003 Admins can manage customer grouping analysis
- KP-002 Admins can view customer grouping reports

Tabel 4. Kebutuhan Non-Fungsional

ID	Function Name	Description
NFL-001	Availability	The system can be accessed by all users, anytime, anywhere, with the condition that it is connected to the server
NFL-002	Reliability	The system can work fully online 24 hours a.
NFL-003	Portability	The system can be opened by several web browser software: Internet Explorer, Google Mozilla, Firefox
NFL-004	Security	System security can be maintained

The creation of a system using the Unified Modeling Language is another step in the design process (UML). A picture representing the proposal interface's look and design, on which the proposed stem is built, will be shown. Figure 1 is a description of the main page and product detail pages.

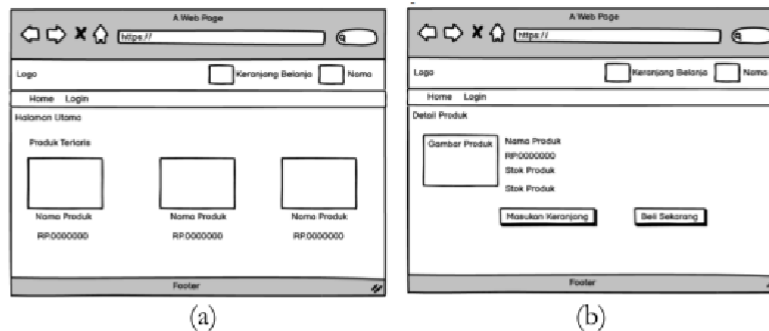
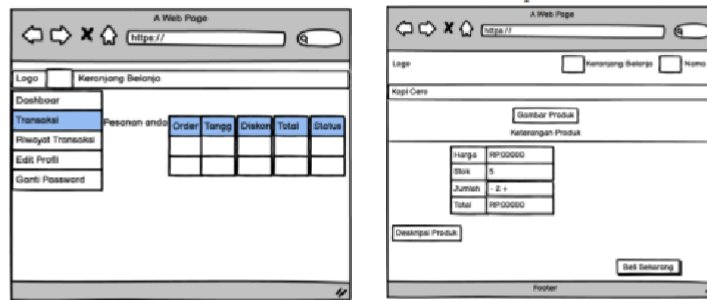


Figure 1. Page Display Design (a) Main, (b) Product Details

While the image for the display of the product cart page and transactions is contained in figure 2.



(a)

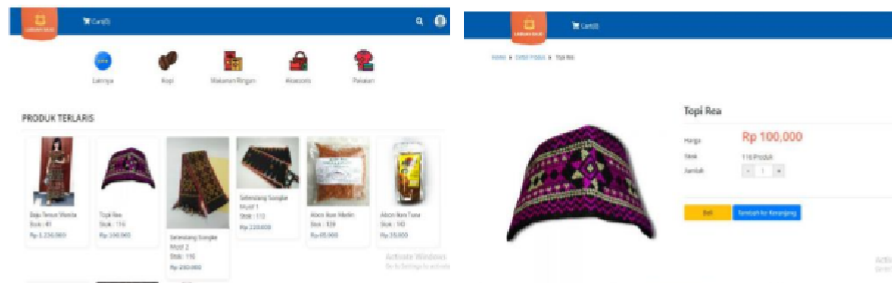
(b)

Gambar 2. Page Display Design (a) Transactions, (b) Product Orders

3. RESULTS AND DISCUSSION

3.1 System Implementation

The following images show how the developed technology has been implemented, namely in the form of a website. For users who already have an account, the website will open to a login page; for those who do not, it will open to a registration/registration page. Figure 3 illustrates how the page will be forwarded to the website's home page when the user checks in using their user account and displays information about the sold figure 3.



(a)

(b)

Gambar 3. Halaman (a) Utama User, (b) Detail Produk

The page after the customer places an order will be shown in figure 4 regarding the order cart page and payment page.

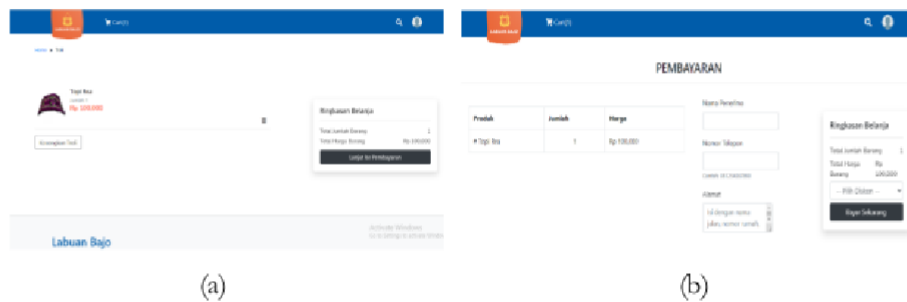


Figure 4. Customer Page for (a) Product Cart (b) Payment

Next is the customer grouping results page using k-means cluster, which is shown in figure 5

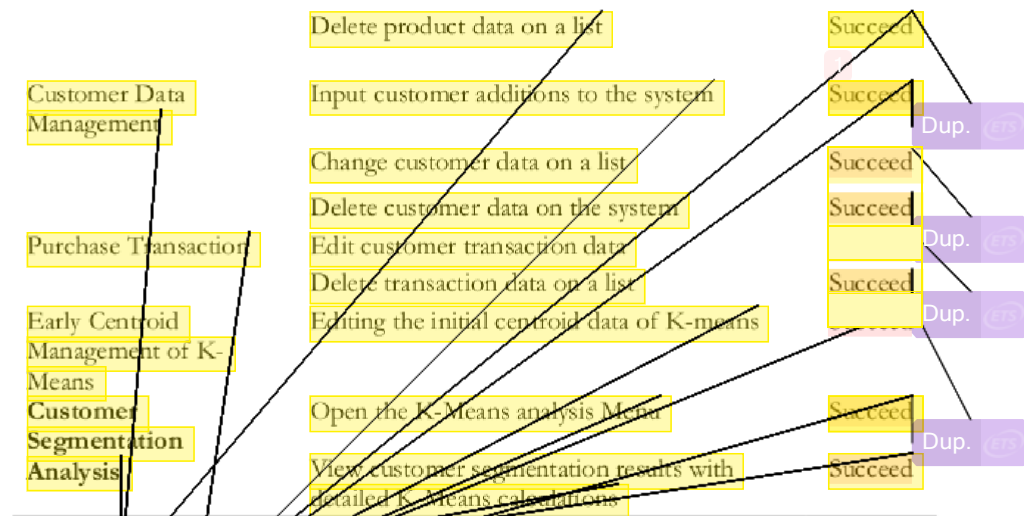
Figure 5 Hasil Akhir K-means

3.2 Test Result

The next stage of implementation is testing using the Black Box test, the black box test results are shown in the table

Table 5. Black Box Test Results Data

Test Page	Test Categories	Test Results
Data Management Categories	Adding data on categories of goods	Succeed
	Change the item category data from the list	Succeed
	Remove item category data from the list	Succeed
Product Data Management	Add product data to the system	Succeed
	Change product data on a list	Succeed



4. CONCLUSION

Based on this research, the RFM method can be used in grouping customers of Labuan Bajo souvenir shops based on buyer loyalty, purchase amount, and the nominal amount of customer shopping. A proven system can make it easier for store owners to transact with customers. Customer loyalty analysis using the K-Means algorithm shows customers consisting of repeat customers, loyal customers, and regular customers, in the span of the last 3 months data shows that typical Labuan Bajo souvenirs have 1 repeat customers, 3 customers, and 6 regular customers.

REFERENCES

- [1] Dian Melisa, "Hubungan Antara Citra Merek Dengan Loyalitas Konsumen Produk The Body Shop Pada Mahasiswi Universitas Diponegoro," *Jurnal Empati*, Volume 5(4), 2016.
- [2] S. S. Prasetyo, M. Mustafid, and A. R. Hakim, "PENERAPAN FUZZY C-MEANS KLUSTER UNTUK SEGMENTASI PELANGGAN E-COMMERCE DENGAN METODE RECENCY FREQUENCY MONETARY (RFM)," *Jurnal Gaussian*, vol. 9, no. 4, pp. 421-433, Dec. 2020, doi: 10.14710/j.gauss.v9i4.29445.
- [3] J. Jamal and D. Yanto, "Analisis RFM dan Algoritma K-Means untuk Clustering Loyalitas Customer," *Jurnal Energy*, vol. 9, no. 1, pp. 1-8, May 2019.
- [4] W. A. Taqwin, N. Y. Setiawan, and F. A. Bachtiar, "Analisis Segmentasi Pelanggan dengan RFM Model pada PT. Arthamas Citra Mandiri

- Menggunakan Metode Fuzzy C-Means Clustering,” *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer*, vol. 3, no. 2, pp. 1986–1993, Feb. 2019.
- [5] Sudriyanto, “Clustering Loyalitas Pelanggan dengan Metode RFM (Recency, Frequency, Monetary) dan Fuzzy C-Means,” in *SNATIF*, 2017, pp. 815–822.
- [6] Sandi, T. A. Armawan, M. Raharjo, J. L. Putra, and R. Ridwan, “Clustering Kesetiaan Pelanggan denan Model RFM (Recency, Frequency, Monetary) dan K-Means,” *Jurnal Pilar Nusa Mandiri*, vol. 14, no. 2, 2018.
- [7] Waroka, Lia, S. Monalisa, D. Anjainah, and N. Arifin, “Implementasi Algoritma Fuzzy C-Means (FCM) dalam Pengklasterisasian Nilai Hidup Pelanggan Dengan Model LRFM,” *Jurnal Ilmiah Rekayasa dan Manajemen Sistem Informasi*, vol. 6, no. 1, 2020.
- [8] A. T. Widiyanto and A. Witanti, “Segmentasi Pelanggan Berdasarkan Analisis RFM Menggunakan Algoritma K-Means Sebagai Dasar Strategi Pemasaran (Studi Kasus PT Coversuper Indonesia Global),” *KONSTELASI: Konvergensi Teknologi dan Sistem Informasi*, vol. 1, no. 1, pp. 204–215, Apr. 2021, doi: 10.24002/konstelasi.v1i1.4293.
- [9] R. Y. Firmansah, J. Dedy Irawan, and N. Vendyansyah, “ANALISIS RFM (REGENCY, FREQUENCY AND MONETARY) PRODUK MENGGUNAKAN METODE K-MEANS,” *JATI (Jurnal Mahasiswa Teknik Informatika)*, vol. 5, no. 1, pp. 334–341, Feb. 2021, doi: 10.36040/jati.v5i1.3282.
- [10] Novendri, “Pengertian Web,” *Lentera Dumai*, vol. 10, no. 2, pp. 46–57, 2019.
- [11] Supriyono, “Software Testing with the Approach of Blackbox Testing on the Academic Information System,” *International Journal of Information System & Technology*, vol. 3, no. 2, pp. 227–233, 2020.
- [12] N. N. N. N, “Penerapan Euclidean Distance pada Pengenalan Pola Citra Sidik jari,” Universitas Islam Indonesia, Yogyakarta, 2018.
- [13] Sudriyanto, “Clustering Loyalitas Pelanggan Dengan Metode RFM (Recenty,Frequency,Monetary) dan Fuzzy C-Means,” *Pros. SNATIF Ke-4*, pp. 815–822, 2017.
- [14] Tikaridha Hardiani, Selo Sulisty, Rudy Hartanto, “Segmentasi Nasabah Tabungan Menggunakan Model RFM (Recency, Frequency,Monetary) dan K-Means Pada Lembaga Keuangan Mikro”,Seminar Nasional Teknologi Informasi dan Komunikasi Terapan (SEMANTIK), 2015.

- [15] E. H. Witten, Ian H. Frank, "Data Mining Practical Machine Learning Tools and Techniques Third Edition". 2011.

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