PAPER • OPEN ACCESS

Loyalty Improvement of Indonesian Local Brand Fashion Customer Based on Customer Lifetime Value (CLV) Segmentation

To cite this article: M Dachyar et al 2019 IOP Conf. Ser.: Mater. Sci. Eng. 598 012116

View the article online for updates and enhancements.

You may also like

 Statistical and dynamical properties of covariant lyapunov vectors in a coupled atmosphere-ocean model—multiscale effects, geometric degeneracy, and error dynamics

Stéphane Vannitsem and Valerio Lucarini

- <u>On the Effect of Stellar Activity on Low-</u> resolution Transit Spectroscopy and the <u>use of High Resolution as Mitigation</u> Frédéric Genest, David Lafrenière, Anne Boucher et al.
- <u>Covariant Lyapunov vectors</u>
 Francesco Ginelli, Hugues Chaté, Roberto Livi et al.





DISCOVER how sustainability intersects with electrochemistry & solid state science research



This content was downloaded from IP address 3.141.200.180 on 05/05/2024 at 02:11

Loyalty Improvement of Indonesian Local Brand Fashion Customer Based on Customer Lifetime Value (CLV) Segmentation

M Dachyar¹, F M Esperanca¹, and R Nurcahyo¹

¹Department of Industrial Engineering, Universitas Indonesia, Depok 16424, Indonesia

mdachyar@yahoo.com

Abstract. There has been a significant growth of internet users over the past decade in Indonesia. The growth of internet users is followed by the growth of digital buyers. Most digital buyers in Indonesia make some transactions to purchase clothing which explains the phenomenon of e-commerce fashion growth. This study aims to identify the loyalty level of an electronic customer based on Customer Lifetime Value (CLV) of the customer segmentation and design the CLV improvement. Customer segmentation performed using the K-means algorithm and RFM analysis. This paper used 3 transaction datasets from 3 different local brand fashion e-commerce in Indonesia. This study found five customer segmentations according to CLV ratings as the best, valuable, potentially valuable, average, and potentially invaluable customer. Maintaining customer convenience while doing the transaction and improving service quality and customer trust are the keys to retaining potentially valuable, average, and potentially invaluable customers

1. Introduction

The high demand for clothing products transactions brings opportunities in new business, especially in clothing line business based on the internet platform. Indonesian entrepreneurs began to compete in starting clothing businesses with internet-based sales. The significant growth of apparel local brands has inflicted the emergence of a competitive environment within the scope of clothing business in Indonesia. All the clothing business are required to have unique competitive advantages in order to ensure their businesses can still compete in the Indonesian market. However, not all business owners know the strength of their respective businesses.

One of the strengths that can be used as the main weapon to survive in the competitive market is to strengthen Customer Relation Management (CRM). Meanwhile, unit businesses of fashion e-commerce in Indonesia are known to be very minimum in using CRM in developing their business processes. It is important for a business unit to make arrangements from relationships with customers in order to ensure the business unit can manage all the satisfied and loyal customers. The aim of the study was using CRM, specialty in clustering customer, to identify CLV and designing steps to improve the CLV. It is expected that with increasing the CLV, the business units will be able to continue to compete in today's competitive market. Clustering method which used in this study is the K-means algorithm with RFM

Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI. Published under licence by IOP Publishing Ltd 1

analysis. The clusters produced by the clustering algorithm were used as a crucial data to design strategy to improve CLV.

2. Literature Review

2.1. E-Commerce

Besides being a place for the digital transaction process of goods and services, e-commerce also acts as a provider of facilities in the proses of digital transaction either for online sellers or buyers [1]. Unlike traditional businesses, online customers do not specifically interact with individuals but customers can interact with the company through a user interface that allows them to start the desired transaction [2]. E-commerce brings many benefits such as personalization, increased product variety and information, and interactivity [3]. Behind the offered benefits, there are several risks that arise, namely: the risk of losing money and privacy [1]. There are 5 kinds of e-commerce [4], such as: Collaborative Commerce (all the business partners in the business supply chain are collaborating based on electronic), B2C Commerce (including goods/services retail transactions from a business unit to individual customer), B2B Commerce (transaction between business unit to another unit), Mobile Commerce (e-Commerce which using wireless, such as: smartphone to access the internet), and C2C Commerce (goods/services transactions).

2.2. Customer Relationship Management (CRM)

CRM is an analytical tool that can support companies to improve their business units performance such as increase their profit, improve their customers satisfaction [5][6][7], and also as the effective marketing and communication strategies [8][9] with customers loyalty, potency and price reduction [10][11]. Mohammadhossein and Zakaria [12] stated that the implementation of CRM brings seven main advantages for the company, namely: provide the ability to discover profitable customers, integrate all the business units, improve the effectiveness and efficiency of the sales potency and the customer service quality, the ability to provide pricing strategies, to provide the options of customization of goods and services, and to improve marketing capabilities in accordance with characteristics of each customer. The purpose of implementing CRM is to create and actualize value for the customers favourably by integrating each process and internal functin of the company with all the external network related to their customers [13]. Then it can be concluded that by implementing CRM, the company can identify and process all the informations of the diverse customers to obtain a strategy which can improve effectiveness and efficiency of all business units performance and bring more profits to company.

2.3. Customer Segmentation

Customer segmentation has a significant effect on customer management through dividing customers into several groups according to their character, where companies can utilize the information contained in this segmentation of customers to market products differently by focusing on the needs of each type of customer group [14]. Customer segmentation can be performed using data mining methods to reveal the hidden information of customer characteristics. To optimize the strategies obtained from CRM processing, company needs to perform multi-criteria analysis in order to complement the segmentation analysis because segmentation analysis doesn't provide the information about relative importance of segments when other variables are noticed [15].

2.4. Customer Lifetime Value

The concept of customer lifetime (CLV) or loyalty is to forecast the customer's loyalty in CRM [16]. CLV is the current worth of all profits obtained from customers and it helps the owner of the business unit target the acceptable markets, additional effectively. By using CLV, company can targeting only the profitable customers who can give more profits to the company in the future [17]. CLV can be

Annual Conference on Industrial and System Engineering (ACISE) 2019

IOP Publishing

IOP Conf. Series: Materials Science and Engineering 598 (2019) 012116 doi:10.1088/1757-899X/598/1/012116

counted in a certain time period or from the first time doing transaction until now [18]. Based on Khajvand and Tarokh [19], there are 6 models as a CLV issues approach, such as RFM, Profitability, Econometric, Persistence, Computer Science, and Diffusion/ Growth model.

3. Methodology

This study used 3 transactions data-sets from 3 unit businesses (LR, MN, and NB) which are selling local brand daily wear for women in Indonesia. Each set-data contains the transaction date, customer ID, product ID, purchase order quantity, billing amount, and customer location (based on delivery address). Each dataset contains data transactions in 12 months.

3.1. Database preparing and processing

Transaction data that has been collected are filtered to obtained important and useful information than can be used as the basic of decision making for the company. Database processing that we used was Ms. Access. On these steps, we selected, collected, and transformed all the data and at the end of these steps we got values of RFM variables for each customer which is used to facilitate the analysis of customer segments.

RFM variables consist of recency (R), frequency (F), and monetary (M). Recency measured by analyzing the time gap between the last transaction date performed by any customer and the last transaction date on 2018. The smaller recency value, the newer transaction happen. Frequency measured by counting the number of transaction(s) which happen throughout the year for each customer. The bigger the frequency value, the more transaction happen throughout 2018. Monetary measured by summing all the total cost of every customer through 2018.

3.2. Customer clustering

On this research, clustering was performed using the K-Means algorithm with values of RFM variables as the basic data. The benefits of using K-Means clustering, namely: K-Means able to process big data in an effective time [20], multipurpose, has a simple equation of distance calculation, and can be altered at each calculation steps [21]. The K-Means algorithm is carried out through 5 stages, such as: (1) Determination of the number of groups (k); (2) Randomly assign data points k to be the initial centroid group; (3) Assign each data point to the group that has the closest centroid; (4) Recalculate the group centroid; and (5) Repeat steps 3 - 5 until termination. We used Elbow method based on the Sum of Square Error (SSE) of each cluster to determine the best k for each e-commerce.

3.3. Customer lifetime value (CLV)

On this research, the level of customer loyalty was described by ranking CLV from each customers groups that have been obtained from the previous stage. Usually, the CLV calculation is performed within a certain period of time or from the first time doing transactions to date [18]. This research used CLV equation using RFM in Eq (1); where N are normal values and W are the weight of recency, frequency, and monetary.

$$CLV = (NR \ x \ WR) + (NF \ x \ WF) + (NM \ x \ WM) \tag{1}$$

First step to do was normalizing the values of RFM in each customers groups from 3 companies used the min-max method according to Eq (2). This is important to do because the values of RFM were in different ranges. The normalization results were in the range 0-1, therefore the value of New_{min} = 0 and New_{max} = 1.

$$NV = \frac{V - Min}{Max - Min} New_{max} - New_{min} + New_{min}$$
(2)

The second step on this stage was calculating the weights of RFM by using pairwise comparison methods developed in the concept of the Analytical Hierarchy Process (AHP). The steps of AHP are as follows [22]:

- a. Pairwise comparisons were carried out using the rating of the importance of the RFM variable by ecommerce fashion experts. This level of importance is assessed in pairs between existing attributes using a scale on the AHP method, namely 1-9 [23].
- b. Calculating inconsistency from an expert judgment in making pairwise comparisons. Good consistency is indicated by value or index of 0. The acceptable inconsistency value is less than 10%.
- c. Calculating the weight of an RFM variable using eigenvalue. The results of expert judgment are shown by matrix pairwise comparisons.

4. Result and discussion

The example of a data transaction which used in this research displayed in Table 1. Table 1 was processed in Ms. Access and translated into the database of RFM value of each customer (Table 2).

ID Transaction	Transaction date	ID Customer	ID Item	Qty	Price/pcs (IDR)	Total price (IDR)	Delivery adress
1	02-Jan-18	RTH	KBTD	11	500,000	5,500,000	Bandung
2	03-Jan-18	ACU	BLA	1	475,000	475,000	Hibrida
3	03-Jan-18	IRNE-H	BLA	2	475,000	950,000	Hibrida
4	03-Jan-18	CTRN-BL	BLA	1	475,000	475,000	Blitar
5	04-Jan-18	ACU	KLA	1	475,000	475,000	Hibrida
570	30-Dec-18	FNNY	KBTB	5	650,000	3,250,000	Jakarta

Table 1. Part of LR's transaction data on 2018

ID Cust	Frequency	Monetary (IDR)	Recency
ACU	8	6,955,000	363
AGSTNA	1	525,000	201
AIKE	1	950,000	241
ALN-LM	1	1,000,000	329
ANSTSIA	4	3,025,000	356
YZI	1	500,000	321

Table 2. Example part of RFM value of LR customers

On this research, we performed K-Means clustering with the number of k (cluster) = 2, 4, 5, 6, 8, 9, and 10 and performed Elbow method. As can be seen in Figure 1, the best k for each companies is 5 based on the theory of Elbow method. The result of RFM values normalization of each customer segments can be seen in Table 3.

YZI

Table 4 shows the results of the RFM weight assessment based on experts judgment can be used because the value of inconsistencies has met the requirements. The assessment results of the experts were combined to determine the weight of each RFM attribute. Inconsistency values after combining all the assessment are also seen to be less than 10%, which is 4.21% where the weight of each attribute can be used (Table 5). These results indicate the importance of RFM attributes to Indonesian local ecommerce fashion brands.



Figure 1. Sum of Square Error (a) LR, (b) MN, (c) NB

Cluster		LR			MN			NB		
Cluster	NR	NF	NM	NR	NF	NM	NR	NF	NM	
1	0.275	0.261	0.402	0.363	0.404	1.000	0.128	1.000	0.982	
2	0.811	0.043	0.005	0.845	0.253	0.077	0.487	0.143	0.253	
3	0.286	0.043	0.007	0.274	0.302	0.154	0.177	0.000	0.087	
4	0.000	1.000	1.000	0.827	0.267	0.462	0.328	0.429	0.532	
5	0.031	0.739	0.133	0.774	0.742	0.000	0.845	0.000	0.083	

Table 3. Normal value of RFM

Table 4. Inconsistency of RFM weighting based on experts

E		%		
Expert	R	F	М	Inconsistency
1	0.063	0.562	0.375	9.05
2	0.064	0.669	0.267	3.90
3	0.059	0.490	0.451	0.81

Table 5. Weight Recency, Frequency, and Monetary

	Recency	Frequency	Monetary	% Inconsistency
Weight	0.062	0.584	0.354	4.21

Based on the weights in Table 5, CLV calculations for each customer segment can be done using Eq (1). The calculation results show varying values, and the difference is quite significant. Table 6 shows the CLV value calculated by Eq (1). Table 6 shows that the LR company has the highest CLV value in the 5th cluster and the lowest CLV value in the 2nd cluster. For MN companies the highest CLV value is owned by the 2nd cluster and the lowest CLV value is owned by the 3rd cluster, while for company NB the highest CLV value is owned by the 3rd cluster and the lowest CLV value is owned by the 2nd cluster. The CLV value is owned by the 2nd cluster.

comparing characteristics between customer segments. Segments with higher CLV values can be categorized as more loyal customers [21].

Cluster	LR		MN		NB	
Cluster	CLV	Rank	CLV	Rank	CLV	Rank
1	0.312	3	1.026	1	0.940	1
2	0.078	4	0.091	4	0.203	3
3	0.046	5	0.201	3	0.042	5
4	0.938	1	0.486	2	0.459	2
5	0.481	2	0.063	5	0.082	4

ters

In this research, analysis of the results of customer segmentation based on RFM attributes, cluster mapping, and customer lifetime value for each customer from LR, MN, and NB companies. Customers were divided into 5 customer groups based on the k-means method with RFM analysis. Table 7 shows that in the LR, MN, and NB customer groups there are several characteristics of RFM with different combinations. The first characteristic is high RFM where customers are categorized as loyal customers and can be named as the best customers. This characteristic explains the categories of customers who have bought recently, often make transactions, and have spent a considerable amount of money as long as they become customers to the company. This characteristic explains that customers who do not make transactions in the near future, very rarely make transactions, and the nominal expenditure when the transaction is relatively small [22]. Clusters with characteristics high R with low FM are clusters with new customers who have recently made transactions, rarely made transactions, and have not spent large sums of money because the relationship with the company has not been well established [22].

The identification of customer loyalty in this study refers to the research of Gucdemir & Selim [15], where customer identification is divided into 5 categories, namely best, valuable, valuable, average, and potentially invaluable customers. The five identifications are labeled according to the CLV rating (can be seen in Table 7). In accordance with RFM characteristics, customer cluster which ranked first in CLV analysis had RFM attributes above the average line and categorized as best customers. The customer cluster which ranked second in CLV analysis had the same RFM characteristics as the first ranked and categorized as valuable customers. Meanwhile, the customer cluster which ranked third in CLV analysis had R values above the average line and FM values below the average line. Customers on this category were categorized as average customers where the large R value shows the character of new customers who recently made a transaction and low FM values indicate that the new customer has not made a large number of transactions and has not spent a large amount of money during the transaction. Furthermore, the customer cluster which ranked fourth and fifth in CLV analysis had the same RFM characteristics where the values were below the average line and categorized as the average and the potentially invaluable customer. Customers in these clusters identified as old customers whose no longer conduct transactions recently and potentially leave the company.

Based on the results of customer segmentation analysis, the companies need approachment strategies to increase customer loyalty from potentially valuable, average, and potentially invaluable customers. Maintaining customer convenience is an important key to retaining the potentially valuable customer [24]. Customer convenience can be maintained by maintaining customer service performances. Customer service performance which affects customer convenience, including responsiveness, the availability of post-transaction service [25], and the performance in problem handling [26]. In addition to maintaining convenience, the company also can perform a competitive price offering. The customer intention to increase the frequency of purchases is influenced by the comparison price offered by the

company and competitors. One of the technicalities which can be performed is by giving promotional codes [27] to the member of potentially valuable customer cluster.

a. The c	ustomers of LR compan	ıy	
Cluster	RFM Characteristic	CLV Rank	Customer label
1	$R\uparrow F\uparrow M\uparrow$	3	Potentially valuable
2	R↓F↓M↓	4	Average
3	R↑F↓M↓	5	Potentially invaluable
4	$R\uparrow F\uparrow M\uparrow$	1	Best
5	$R\uparrow F\uparrow M\uparrow$	2	Valuable
b. The c	ustomers of MN compa	ny	
Cluster	Characteristic RFM	CLV Rank	Customer label
1	$R\uparrow F\uparrow M\uparrow$	1	Best
2	$R\uparrow F\downarrow M\downarrow$	4	Average
3	$R\uparrow F\uparrow M\uparrow$	3	Potentially valuable
4	$R\uparrow F\uparrow M\uparrow$	2	Valuable
5	$R{\downarrow}F{\downarrow}M{\downarrow}$	5	Potentially invaluable
c. The c	ustomers of NB compar	ıy	
Cluster	Characteristic RFM	CLV Rank	Customer label
1	$R\uparrow F\uparrow M\uparrow$	1	Best
2	$R\uparrow F\uparrow M\uparrow$	3	Potentially valuable
3	$R{\uparrow}F{\downarrow}M{\downarrow}$	5	Potentially invaluable
4	$R\uparrow F\uparrow M\uparrow$	2	Valuable
5	$R \downarrow F \downarrow M \downarrow$	4	Average

Table 7 Customers characteristics of each company

The first step to retaining the average and potentially invaluable customers is by conducting a survey to assess customer satisfaction. Research by Afsar, Nasiri, & Zadeh [25] stated that unsatisfied customer tends to untrust the company and make customer have no desire to make another transaction. Customer trust towards the company is important considering the fact that the relationship between customers and e-commerce is only a virtual relationship. Therefore, the second step to retaining the average and potentially invaluable customers is by improving the communication services capabilities of the company. According to the research of Anand, Rakesh, Chang, & Manoj [28] which stated that communication services capabilities in e-commerce affect customer trust which can succeed the customer retention.

Customer trust also can be increased by improving the image of the company. By improving the image, it is expected that customer trust will increase and bring a great impact on increasing the frequency and monetary value of the customer. Hence, the third step suggested is for the company to make special attention in controlling all the contents on their sales media, for example Instagram, website, etc. Media content which can influence customer trust, namely information content, easiness in using media while doing the transaction, and the quality of online customer service [29].

5. Conclusions and future research

This research aimed to provide some tactical steps for Indonesian local brand fashion e-commerce in order to improve their customer loyalty based on CLV segmentation. The results showed that from 3 Indonesian local brand fashion e-commerce have 5 customer groups based on CLV ratings, namely best, valuable, potentially valuable, average, and potentially invaluable customers. The strategic steps that can be taken by the company to improve the potentially valuable, average, and potentially valuable customers are by maintaining customer convenience and increasing customer trust through the company's image and customer service quality performance.

For future research it is recommended to use other algorithms to perform customer segmentation. Apart from that, research can also be developed to identify important factors that influence customer loyalty regarding the quality of online customer service.

References

- [1] Nisar T M and Prabhakar G 2017 Journal Retail Consumer Serv 39 135-44.
- [2] Dachyar M and Athory E S 2015 Journal Phys 622 12-6.
- [3] Kemény I, Simon J, Nagy Á and Szucs K 2016 Ind. Manage Data Syst 116 1946-66.
- [4] Turban E, King D, Lee J K, Liang T-P and Turban D C 2015 Electronic Commerce: A Managerial and Social Networks Perspective 8th Edition (Switzerland: Springer).
- [5] Koçoglu D and Kirmaci S 2012 Int. J. Bus. Soc. Sci 3 282-91.
- [6] Nguyen B and Mutum D 2012 J. Bus. Process Manage 18 2-4.
- [7] Safa N S and von Solms R.South African 2016 J. Inf. Manag 18 1-9.
- [8] Gikenye W 2011 J. Gender, Information, and Development in Africa 1 43-56.
- [9] Lendel V and Varmus M 2015 Business: Theory and Practice 16 63-74.
- [10] Ahmad M S, Rashid, S and Ul-Mujeeb E 2012 Bus. Strategy Series 13 323-30.
- [11] Dolly P and Pruthi A 2014 Int. J. Adv. Res. Comput. Software Eng 4 1363-66.
- [12] Mohammedhossein N and Zakaria D H 2012 Int. J. Eng. Res. Appl 1 578-86.
- [13] Buttle F and Maklan S 2015 Customer Relationship Management (New York: Routledge).
- [14] Elena L M 2016 Bulletin of Transilvania University of Brasov 9 52-60.
- [15] Güçdemir H and Selim H 2015 Ind. Manage. Data Syst 115 1022-40.
- [16] Chuang H M and Shen C C 2008 Int. J. Mach. Learn. Cyb 1 168-73.
- [17] Kumar V and Reinartz W 2012 Customer Relationship Management: Concept, Strategy, and Tools 2nd Edition (New York: Springer).
- [18] Shahin A and Shahiverdi S M 2015 Benchmarking An International Journal 22 857-73.
- [19] Khajvand M, Zolfghar K, Ashoori S and Alizadeh S 2011 Procedia Computer Science **3** 57-63.
- [20] Bain K K, Firli I and Tri S 2016 J. Theor. App. Inf. Technol 90 23-30.
- [21] Celebi M E, Kingravi H A and Vela P A 2013 J. Exp. Syst. Appl 40 200-10.
- [22] Liu D-R and Shih Y-Y 2005 J. Inf Manage 42 387-400.
- [23] Saaty T L and Vargas L G 2000 Models, methods, concepts, and applications of the Analytical Hierarchy Process (Boston: Kluwer Academic Publishers).
- [24] Behravan N, Jamaizadeh M, Jouya S F and Markhali A Y 2012 J. App. Sci 12 2312-18.
- [25] Afsar A, Nasiri Z and Zadeh M O Mediterranean 2013 J. Soc. Sci 4 547-53.
- [26] Durmus B, Ulusu Y and Erdem S 2013 Proc. Soc. Behav. Sci. (Latvia) 99 420.
- [27] Kim J-H and Kim M 2018 Serv. Ind. J. 1-35.
- [28] Anand K J, Rakesh N, Chang H P and Manoj K A 2018 J. Bus. Res 92 25–35.
- [29] Dachyar M and Banjarnahor L 2017 Intangible Capital 12 946-66.