

CUSTOMER SEGMENTATION ANALYSIS BASED ON THE CUSTOMER LIFETIME VALUE METHOD

JAM

17, 3

Received, June 2019

Revised, July 2019

August 2019

Accepted, August 2019

Edwin Agung Pratomo

Faculty of Economic Management, Institut Pertanian Bogor

Mukhamad Najib

Heti Mulyati

Department of Management, Institut Pertanian Bogor

Abstract: Companies need to understand the customers' data better in all aspects. Detecting similarities and differences among customers, predicting their behaviors, proposing better options and opportunities to customers became very important for customer-company engagement. Companies need a database of customer that contains customer information in detail, one of which is data about the potential value of each customer. Customer Lifetime Value (CLV) measures the potential value of each customer from the perspective of a service or product provider. This study aims to analyze Customer Lifetime Value (CLV) of the customer and clustering it into customer segmentation using the K-means cluster method. The results showed the highest average CLV value with is Rp 19,170,991,- and the lowest average value is -Rp 112,566,-. The customer clustering produced in this study is four segments with the majority of customers at cluster 3 segment low with 51 unit population.

Keywords: customer relationship management, customer life time value, k-means clustering

Cite this article as: Pratomo, E. Agung, Mukhamad Najib, and Heti Mulyati. 2019. *Customer Segmentation Analysis Based On the Customer Life time Value Method*. Jurnal Aplikasi Manajemen, Volume 17, Number 3, Pages 408–415. Malang: Universitas Brawijaya. <http://dx.doi.org/10.21776/ub.jam.2019.017.03.04>



Journal of Applied
Management (JAM)
Volume 17 Number 3,
September 2019
Indexed in Google Scholar

Corresponding Author:
Edwin Agung Pratomo, Faculty
of Economic Management,
Institut Pertanian Bogor, DOI:
[http://dx.doi.org/10.21776/
ub.jam.2019.017.03.04](http://dx.doi.org/10.21776/ub.jam.2019.017.03.04)

In the current era, only a few companies are trying to manage by providing data or information from each customer that they have, (Selvi and Ravi, 2013), they only interact and transact business with their customers. Companies only measure their success from how much they have loyal customers, whereas loyal customers do not necessarily give benefit (Kumar and Rajan, 2009).

Companies regularly use traditional methods to measure the value of their customers, and it can cause companies to implement less effective marketing strategies that can drain company resources. Customer Value Management lies in the idea that resource allocation will be different for each customer. The basic of this different allocation of resources is the economic value of the customer towards the company. Therefore, companies must have an understanding of the value of each customer's contribution to the company. According to Farris et al. (2008), several concepts in measuring these values are Customer Profitability Analysis (CPA), Recency and Retention Rate Analysis,

and Customer Lifetime Value (CLV). Researchers recommend CLV as a metric for selecting customers and designing marketing programs, (Reinartz and Kumar, 2003) and (Rust et al. 2004).

Customer equity is seen as an intangible asset that is considered difficult to identify, but as technology and science develop, it is possible to know the value of customer equity appropriately. Companies need strategies and benchmarks in their efforts to manage their customers, one of which is evaluating the value of their customers through the calculation of Customer Lifetime Value (CLV). CLV is seen as the present value of future cash flows relating to customers (Pfeier et al. 2005). Using CLV will help companies get to know customers, then customers can be grouped so that the company will provide services in accordance with the needs and behavior of these customers. CLV can also help companies know the potential value of customers, (Kim and Lee, 2007), and explained that knowing CLV from customers helps management to segment customers as a basis for making decisions in managing customers. PetrCermak (2015) stated that CLV is one model for analyzing the company's financial performance. By finding the lifetime value of the customer segment, it will provide clear information about the value of each type of customer (Buraera et al., 2014).

PT. Agricon Putra Citra Optima (APCO) under the trade name "Terminix" is the largest service company in the pest control industry in Indonesia. It is shown that 33 branch offices have served all Indonesian regions. The right sales strategy in developing the pest control business has succeeded in increasing the growth in the number of customers each year, the percentage growth in the number of customers on average increased by 43% from 2013-2017. With the increasing number of custom-

ers owned by the company and not all customers make a good contribution, it is necessary for a company that needs to map the value of customers from the financial side so that the company has a basis in selecting its customers. One strategy in calculating customer value in the future is by calculating Customer Lifetime Value (CLV) for each customer and clustering it into customer segmentation. Segmentation is a strategy to determine the structure of audiences and targeting is to choose how to choose, select, and select the target audience (Kotler, 2008). According to OnurDogan in his journal, clustering which one of the tasks of datamining has been used to group people, objects, in the research also mentioned about the importance of classifying customers to be more concerned with the needs and needs of customers, with the aim of the company can involve the product in accordance with the wishes and needs of the customer itself, (Onur et al., 2018).

At present, PT. APCO does not yet have information about the value of customers who have high prospects and contributions in the future. PT. APCO needs to determine the value of the customer and segment the customer as a basis for making service or selection strategy based on customer value categories (differentiation).

This study aims to analyze customers who have high prospects and contributions based on the Customer Lifetime Value (CLV) approach and map customer segmentation based on the CLV value.

METHOD

The data used in this study is secondary data. Secondary data is obtained in the form of company data, which is then processed according to research needs. The types and sources of data to be taken are as follows:

Table 1 Type and Data Source

Secondary Data:

- Customer data obtained in the form of order service query taken from the branch operational system on April 2018
- Revenue
- Service cost : raw material cost, supporting material cost, operational cost, labour cost
- Sales and marketing cost
- Profit and loss

To calculate the CLV using the Customer Lifetime Value method according to Gupta, Lehmann, and Stuart (2004) using the following formula:

$$CLV = \sum_{t=0}^T \frac{(p_t - c_t)r_t}{(1+i)^t} - AC$$

Where :

p_t : the price paid by a customer at a time

c_t : cost of servicing the customer at a time

i : discount rate or cost of capital for the company

r_t : the probability of customer repeat buying at a time.

AC : acquisition cost

T : time horizon for estimating CLV.

In this study, the value of acquisition costs (AC) that used is the average value of sales and marketing costs during 2017, and the retention rate (rt) was taken from the branch renewal report. Cost of capital (i) is obtained from the bank loan interest rates owned by the company. The results of the calculation of CLV values obtained for each customer, then customer segmentation is carried out based on the CLV value.

Customer segmentation refers to existing customers divided into several customer groups according to certain standards (He and Li, 2016). The method that used in customer segmentation is the clustering method. Clustering called as the segmentation data in several applications because classifying data that has the same characteristics grouped into one group and data that has different characteristics are grouped with other groups so that data in one group has a small level of variation (Kantardzic, 2011). Clustering is a method used in various fields, including customer segmentation, customer behavior, customer profitability, etc.

The most commonly used method is the K-Means Cluster algorithm (Berry and Linoff, 2008). The K-Means algorithm is a clustering algorithm that classifies data based on the center of the cluster (centroid) closest to the data. The purpose of K-Means is grouping data by maximizing the similarity of data in one cluster and minimizing the similarity

of data between clusters. The size of the similarity used in the cluster is a function of distance so that maximizing the similarity of data is obtained based on the shortest distance between data to the point of the centroid (Asroni and Adrian, 2015). Customers will be classified into four segments that are described in customer mapping.

RESULTS

The company's customer population is 145 units consist of various business segments such as food processing, hotel, restaurant, shop, office, warehouse, educational facility, health and beauty facility, entertainment facility and manufacturing. That the research can get the result of overall research on total customers as many as 145 units of customers used as samples in this study.

Table 2 Customer profile

Type	Unit	Percentage (%)
Education facility	2	1%
Food processing facility	10	7%
Hotel	1	1%
Health and beauty facility	5	3%
Manufacture	37	26%
Entertainment facility	2	1%
Office building	13	9%
Restaurant	21	14%
Mart	8	6%
Warehouse and distribution	46	32%

Secondary data which are variables for calculating CLV such as revenue, cost, discount rate, retention rate, acquisition cost and time period are calculated using the CLV formula. The results of processing all variables with the CLV formula produced various CLV values that and are sorted from the smallest CLV value to the largest CLV value, then CLV values are segmented using the K-means Cluster method. The CLV calculation results show the lowest CLV value is Rp. 4,691,676, - obtained from customers of PT.DPO Indonesia and the highest CLV value is Rp.28,171,966, - from a customer of PT. Sekawan Karsa Mulia with an average value CLV is Rp.4,645,850, -.

Tabel 3 Customer Descriptive Statistics

Descriptive Statistics CLV		Information	
		Company	Klaster
Minimum	-Rp 4,691,676	DPOI	4 (Very Low)
Median	Rp 3,479,027	TTR	3 (Low)
Maximum	Rp 28,171,966	SKM	1 (High)
Average	Rp 4,645,850		

The results of data processing from CLV value using the R application, CLV clustering produced 4 (four) segments, as follow: *Very Low*, *Low*, *Mid* and *High*, from these results it can be seen that:

Customer details with the *Very Low* category are sorted according to the CLV value in Table 4 as follows:

Table 4 Segmentation of very low CLV

No	Pelanggan	CLV	Segment
1	AJ	Rp 325,537	Very Low
2	API 1	-Rp 782,631	Very Low
3	API 2	-Rp 1,200,977	Very Low
4	AMB	-Rp 660,297	Very Low
5	AB	Rp 551,233	Very Low
6	AMD	-Rp 703,043	Very Low
7	And	-Rp 256,409	Very Low
8	AO	Rp 1,124,501	Very Low
9	AR	-Rp 1,401,571	Very Low
10	BEKD	Rp 1,213,218	Very Low
11	BSL	-Rp 1,346,748	Very Low
12	DPOI	-Rp 4,691,676	Very Low
13	EL	Rp 612,678	Very Low
14	ECI	Rp 342,705	Very Low
15	FNI	Rp 805,475	Very Low
16	HTA	-Rp 758,409	Very Low
17	HTR	Rp 576,949	Very Low
18	IP 1	-Rp 185,940	Very Low
19	IP 2	-Rp 234,548	Very Low
20	IP 3	-Rp 234,548	Very Low
21	INC	Rp 1,239,406	Very Low
22	JY	Rp 97,099	Very Low
23	KP	Rp 69,432	Very Low
24	KGI	Rp 567,984	Very Low
25	KCS	-Rp 626,295	Very Low
26	LTA	Rp 720,678	Very Low
27	MJA	-Rp 2,112,103	Very Low
28	NPS	Rp 1,390,150	Very Low

29	OPI	-Rp 134,930	Very Low
30	PAIO	-Rp 479,118	Very Low
31	RN	Rp 251,365	Very Low
32	SDD	-Rp 204,296	Very Low
33	SKMS	-Rp 1,106,082	Very Low
34	SR	Rp 399,387	Very Low
35	SSM	Rp 1,394,159	Very Low
36	SK	Rp 1,391,945	Very Low
37	TFSB 1	-Rp 764,213	Very Low
38	TFSB 2	Rp 90,719	Very Low
39	TesMdc	Rp 1,365,972	Very Low
40	TK	-Rp 145,198	Very Low
41	TBM	-Rp 714,714	Very Low
42	UMI	-Rp 514,603	Very Low

Customer details with the *Low* category are sorted according to the CLV value in table 5 as follows:

Tabel 5 Segmentation of low CLV

No	Pelanggan	CLV	Segment
1	AJ	Rp 325,537	Very Low
1	ABCHK	Rp 2,952,335	Low
2	ABCHT	Rp 3,523,441	Low
3	ABCHB	Rp 1,760,068	Low
4	A78	Rp 3,417,607	Low
5	ASE	Rp 1,639,326	Low
6	ASC	Rp 3,811,321	Low
7	BAJ	Rp 3,870,251	Low
8	BMAM	Rp 2,204,142	Low
9	BA	Rp 1,653,232	Low
10	BR	Rp 2,649,743	Low
11	BAS	Rp 4,136,518	Low
12	BB	Rp 2,413,947	Low
13	BSM	Rp 3,050,229	Low
14	BK	Rp 3,431,224	Low
15	BR	Rp 2,956,882	Low

16	CMP 1	Rp 1,619,693	Low	10	CI	Rp 8,119,504	Mid
17	CMP 2	Rp 4,294,330	Low	11	CGL	Rp 8,114,046	Mid
18	CCO	Rp 3,286,859	Low	12	ELKR	Rp 7,227,119	Mid
19	DCD	Rp 2,074,325	Low	13	EDI	Rp 4,931,666	Mid
20	ECR	Rp 2,643,323	Low	14	FDT	Rp 6,637,202	Mid
21	EM	Rp 3,412,390	Low	15	GPE	Rp11,405,107	Mid
22	EMN	Rp 4,037,837	Low	16	GC	Rp 6,598,517	Mid
23	FABI	Rp 3,520,313	Low	17	IGM	Rp 7,701,515	Mid
24	GDN	Rp 4,399,597	Low	18	ICP	Rp 7,227,119	Mid
25	GPI	Rp 1,973,932	Low	19	IDC	Rp 8,182,797	Mid
26	GS	Rp 2,173,889	Low	20	IDNA	Rp 5,646,641	Mid
27	HTA	Rp 2,061,929	Low	21	IMP	Rp11,950,984	Mid
28	IMS Gd D	Rp 4,215,366	Low	22	KIN	Rp 7,664,800	Mid
29	IMSLI	Rp 3,581,546	Low	23	KG	Rp 9,243,124	Mid
30	IDN	Rp 3,661,399	Low	24	KFT	Rp 5,036,793	Mid
31	IDL	Rp 2,654,143	Low	25	KBS	Rp 5,649,598	Mid
32	JTM	Rp 1,694,253	Low	26	NGN	Rp11,564,427	Mid
33	KSM	Rp 3,589,391	Low	27	PMJ	Rp 7,187,344	Mid
34	KG	Rp 4,289,018	Low	28	PP	Rp 7,726,361	Mid
35	KPSGKK	Rp 3,662,072	Low	29	PDLR	Rp 7,521,058	Mid
36	MTL	Rp 2,728,610	Low	30	PSC	Rp 4,857,819	Mid
37	MML	Rp 3,582,131	Low	31	PAIDC	Rp 6,370,787	Mid
38	PI	Rp 2,002,761	Low	32	PRI	Rp 5,190,754	Mid
39	RN	Rp 2,207,450	Low	33	PFN	Rp 7,986,402	Mid
40	RPM	Rp 1,555,539	Low	34	RPXRCB2	Rp 6,565,143	Mid
41	RB	Rp 2,187,149	Low	35	SKMO	Rp 5,590,376	Mid
42	ST	Rp 1,555,539	Low	36	SMM	Rp 7,776,880	Mid
43	SAB	Rp 3,978,526	Low	37	TK	Rp 6,647,489	Mid
44	SAV	Rp 4,479,726	Low	38	UIC	Rp10,452,790	Mid
45	SLD	Rp 3,479,027	Low	39	WD	Rp 4,733,313	Mid
46	SJ	Rp 3,567,000	Low	40	WT	Rp11,090,769	Mid
47	TS	Rp 2,366,320	Low	41	YU	Rp 9,203,037	Mid
48	TKMS	Rp 2,796,942	Low				
49	TTR	Rp 3,479,027	Low				
50	TY	Rp 4,549,669	Low				
51	VIK	Rp 3,541,835	Low				

Tabel 6 Segmentation of mid CLV

No	Pelanggan	CLV	Segment
1	AFU	Rp 5,572,025	Mid
2	ALC	Rp 7,945,738	Mid
3	AQS	Rp 5,712,716	Mid
4	BSL	Rp10,181,532	Mid
5	BMC	Rp 7,501,485	Mid
6	BNJ	Rp 8,458,229	Mid
7	BS	Rp 5,995,292	Mid
8	BNTR	Rp 7,880,989	Mid
9	BBV	Rp12,072,668	Mid

Tabel 7 Segmentation of high CLV

No	Pelanggan	CLV	Segment
1	AGI	Rp 14,324,382	High
2	ANNI	Rp 21,089,683	High
3	GMC	Rp 22,260,268	High
4	MLI	Rp 18,289,907	High
5	MR	Rp 14,755,370	High
6	NL	Rp 18,532,730	High
7	SMTR	Rp 20,313,175	High
8	SMM	Rp 13,701,083	High
9	SKM	Rp 28,171,966	High
10	TK	Rp 17,453,166	High
11	TES	Rp 21,989,176	High

1. Cluster 1 (one) is a group of customers with the High category, with centroid or average CLV is Rp. 19,170,991.
2. Cluster 2 (second) is a group of a customer with Mid category, with centroid or average CLV is Rp. 7,637,121.
3. Cluster 3 (third) is a group of a customer with Low category with centroid, or average CLV is Rp. 3,026,924.
4. Cluster 4 (fourth) is a group of a customer with Very Low category with centroid, or average CLV is -Rp. 112,566.
5. Majority of customers are in cluster 3 (Low).
6. The minority of customers are in cluster 1 (High).

Tabel 8 Segmentation of CLV

Cluster	Status	Centroid	Population	Percentage (%)
1	High	Rp 19,170,991	11	8%
2	Mid	Rp 7,637,121	41	28%
3	Low	Rp 3,026,924	51	35%
4	Very Low	-Rp 112,566	42	29%

DISCUSSION

This research produces four levels of customer segmentation based on the respective CLV values, namely the Very Low, Low, Mid and High segments, where each of the levels of segmentation will determine different sales strategy. It is consistent and in line with previous research with the title *Customer Value* Aviliani (2012) which emphasizes the importance of the CLV strategy in mapping the value of customer contributions to the company. CLV analysis can be used as the basis for managing customers to increase the value of their contribution, where one of the strategies are Up-Selling and Cross-Selling strategy to increase company revenue. The Up-Selling and Cross-Selling Strategy to increase CLV value is also in line with Nurturing the Right Customer (Kumar and Rajan, 2009).

Based on the results of the analysis, in table 4, the level of segmentation provides direction for the company to make strategies that are appropriate for each customer segment. Optimal implementation of CRM is one of which is to make customer selection based on the value of its contribution. The company also needs to carry out an analysis from the operational side in serving customers, whether there is inefficiency in serving customers so that it produces a minus CLV value.

Customers with a minus CLV value (very low segment), the company needs to immediately carry out efficiency to obtain the loss and reengineer the relationship when the cooperation contract is renewed. Reengineering contract can be either reduce the level of service or propose price adjustment to the ideal point. If the reengineering of relationships cannot be agreed upon, the company needs to end the relationship so that the losses not increase.

The low segment customer even though has a small CLV value (not minus) and the mid-segment still have the potency to make a positive contribution going forward by making a relationship improvement strategy by increasing sales from these customers. The strategy that can increase sales is by implementing an up-selling and cross-selling strategy, with special programs that attract companies to encourage customers to increase the volume, frequency of purchases on the same products/services or increase purchases on different products.

Customers in the high segment must be a serious concern for the company because this customer segment makes a very good contribution. The number of customers in this segment is not as much as other segments, so if the company loses 1 (one) customer, it will be enough to affect the company's financial performance.

The strategy to keep high segment customer is by conducting a retention program to maintain cus-

tomers loyalty to the company, Table 9 Grouping strategies based on customer CLV segmentation.

Table 9 Analysis segmentation CLV dan strategy

Cluster	Segmentation	Centroid	Population	Strategy
1	High	Rp 19,170,991	11 8%	Retention and Loyalty Program
2	Mid	Rp 7,637,121	41 28%	Upselling and Cross Selling Program
3	Low	Rp 3,026,924	51 35%	Upselling dan Cross Selling Program
4	Very Low	-Rp 112,566	42 29%	Reengineering Contract or End Relation

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Customers dominate the results of customer CLV analysis with *Very Low* and *Low* segmentation. For Low segment customer, the strategy should be focused on upselling and cross-selling strategies or strategy to increase sales to increase revenue, which will increase the customer's CLV value. The Very Low segment tend to produce minus CLV value so that the tactical strategy that can be done is to make efficiency and improve the price clause when the work contract ends or end the relationship if the price adjustment cannot be agreed.

Recommendations

Based on the conclusions described above, this study has limitations, so it is necessary to make improvements in several aspects of research. Some suggestions, according to researchers that the management of PTAPCO needs to consider it. The application of a CRM system that is more focused on managing customer databases, to be able to map the customer's financial contribution to the profitability of the company. It is necessary to do a CLV analysis of customers in other branches of PT APCO. In addition to analyzing customer profiles and customer CLV values, it is also necessary to analyze payment performance of customers, because good customers have not only good financial contributions but also make good contributions to the company's cash flow. Based on the analysis of CLV

value segmentation, PT APCO needs to conduct customer selection specifically to select customers who do not provide positive (minus) contributions to the company.

REFERENCES

- Asroni, Ronald Adrian. 2015. *Penerapan Metode K-Means Untuk Clustering Mahasiswa Berdasarkan Nilai Akademik Dengan Weka Interface Studi Kasus Pada Jurusan Teknik Informatika UMM Magelang*. Jurnal Ilmiah Semesta Teknika. Vol. 18 (1), 76-82.
- Aviliani. 2012. *Analisa Segmentasi Nasabah Tabungan Bank berdasarkan Customer Value Studi Pada PT. Bank BRI Tbk. Disertasi*. Sekolah Pasca Sarjana Institut Pertanian Bogor.
- Berger P. D. and N. I. Nasr. 1998. *Customer Lifetime Value: Marketing Models and Applications*. Journal of Interactive Marketing, Volume 12, 1, 17-30.
- Berry, M. J. A. and Linoff, G. S., 2008. *Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management. Second edition*.
- Buraera J, Kadir. Abd, Alam S. 2014. *Customer Lifetime Value Segmen Konsumer dan Retail pada PT. Bank Negara Indonesia (Persero) Tbk*. Jurnal Analisis ISSN, 3 (2).
- Buttle. 2004. *Customer Relationship Management*. Malang: Bayu Media.
- Cermak P. 2015. *Customer Profitability Analysis and Customer Life Time Value Model: Portofolio Analysis*. University of Economics, Prague.
- Farris P. W., Bendle N. T., Pfeifer P. E., and Reibstein D. J. 2008. *Marketing Metric*. Jakarta: Akademia.
- Gupta, Sunil, Lehmann, and Stuart. 2004. *Valuing Customers*. Journal of Marketing Research, 41 (1), 7-18.

- He, X. and Li, C., 2016. *The Research and Application of Customer Segmentation on Ecommerce Websites*. doi:10.1109/ICDH.2016.47.
- Kantardzic, Mehmed. 2011. *Data Mining: Concepts, Models, Methods, and Algorithms*. New Jersey: John Wiley & Sons, Inc., Hoboken.
- Kim, E., and Lee, B. 2007. *An Economic Analysis of Customer Selection and Leverage Strategies in A Market where Network Externalities Exist*. Decision Support Systems. 44 (1) 124-134.
- Kotler P. and Armstrong. 2008. *Prinsip-Prinsip Pemasaran*, second edition 12 (1), 225. Jakarta: Erlangga.
- Kumar, V. and Rajan, B. 2009. *Nurturing the Right Customer*. Strategic Finance.
- Monalisa, S. 2017. Klasterisasi Customer Lifetime Value Dengan Model Lrfm menggunakan Algoritma K-Means. Jurnal Teknologi Informasi dan Komputer, 5(2).
- Onur, D., Ejder, A., and Zeki Atıl, B. 2018. *Customer Segmentation by Using RFM Model and Clustering Methods: A Case Study in Retail Industry*. International Journal of Contemporary Economics and Administrative Sciences, 1-20.
- Pfeifer, P.E., Hanskins, M.E., and Contoy, R. M. 2005. *Customer Lifetime Value, Customer Profitability and the Treatment of Acquisition Spending*. Journal of Managerial Issues, 17(1).
- Rust, Roland T., Valarie A. Zeithaml, and Katherine N. Lemon. 2004. *Return on Marketing: Using Customer Equity to Focus Marketing Strategy*. Journal of Marketing, 68 (January), 23–53.
- Selvi, K.R and Ravi, R. 2013. *The Organizational Achieving Customer Lifetime Value through Customer Relationship Management*. Asia Pacific Journal of Marketing and Management, 2(6).
- Venkatesan, R. and Kumar, V. 2004. *A Customer Lifetime Value Framework for Customer Selection and Resource Allocation Strategy*. Journal Marketing, 68. 106-125.