CUSTOMER SEGMENTATION ANALYSIS BASED ON THE CUSTOMER LIFETIME VALUE METHOD

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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 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 lifetime value, k-means clustering

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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,
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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 (Pfeifer 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. PetrCermark (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 customers 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:

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

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.

| 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, -.
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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:

| 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 | H L       | 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 1,329,406 | 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:

| No | Pelanggan | CLV   | Segment |
|----|-----------|-------|---------|
| 1  | AJ        | Rp 325,537 | Very Low |
| 2  | ABC HK    | Rp 2,952,335 | Low     |
| 3  | ABC HT    | Rp 3,523,441 | Low     |
| 4  | ABC HB    | Rp 1,760,068 | Low     |
| 5  | A78       | Rp 3,417,607 | Low     |
| 6  | ASE       | Rp 1,639,326 | Low     |
| 7  | ASC       | Rp 3,811,321 | Low     |
| 8  | BA J      | Rp 3,870,251 | Low     |
| 9  | BM AM     | Rp 2,204,142 | Low     |
| 10 | BA        | Rp 1,653,232 | Low     |
| 11 | BR        | Rp 2,649,743 | Low     |
| 12 | BAS       | Rp 4,136,518 | Low     |
| 13 | BB        | Rp 2,413,947 | Low     |
| 14 | BSM       | Rp 3,050,229 | Low     |
| 15 | BK        | Rp 3,431,224 | Low     |
| 16 | BR        | Rp 2,956,882 | Low     |
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16 CMP 1 Rp 1,692,693 Low
17 CMP 2 Rp 4,294,330 Low
18 CCO Rp 3,286,859 Low
19 DCD Rp 2,074,325 Low
20 ECR Rp 2,643,323 Low
21 EM Rp 3,412,390 Low
22 EMN Rp 4,037,837 Low
23 FABI Rp 3,520,313 Low
24 GDN Rp 4,599,549 Low
25 GPI Rp 1,973,932 Low
26 GS Rp 2,173,889 Low
27 HTA Rp 2,061,929 Low
28 IMS Gd D Rp 4,215,366 Low
29 IMSLI Rp 3,581,546 Low
30 IDN Rp 3,661,399 Low
31 IDL Rp 2,654,143 Low
32 JTM Rp 1,694,253 Low
33 KSM Rp 3,589,391 Low
34 KG Rp 4,289,018 Low
35 KPSGKK Rp 3,662,072 Low
36 MTL Rp 2,728,610 Low
37 MML Rp 3,582,131 Low
38 PI Rp 2,002,761 Low
39 RN Rp 2,207,450 Low
40 RPMM Rp 1,555,539 Low
41 RB Rp 2,187,149 Low
42 ST Rp 1,555,539 Low
43 SAB Rp 3,978,526 Low
44 SAV Rp 4,479,726 Low
45 SLD Rp 3,479,027 Low
46 SJ Rp 3,567,000 Low
47 TS Rp 2,366,320 Low
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

| No | Pelanggan | CLV     | Segment |
|----|-----------|---------|---------|
| 16 | CMP 1     | Rp 1,692,693 | Low     |
| 17 | CMP 2     | Rp 4,294,330 | Low     |
| 18 | CCO       | Rp 3,286,859  | Low     |
| 19 | DCD       | Rp 2,074,325  | Low     |
| 20 | ECR       | Rp 2,643,323  | Low     |
| 21 | EM        | Rp 3,412,390  | Low     |
| 22 | EMN       | Rp 4,037,837  | Low     |
| 23 | FABI      | Rp 3,520,313  | Low     |
| 24 | GDN       | Rp 4,599,549  | Low     |
| 25 | GPI       | Rp 1,973,932  | Low     |
| 26 | GS        | Rp 2,173,889  | Low     |
| 27 | HTA       | Rp 2,061,929  | Low     |
| 28 | IMS Gd D  | Rp 4,215,366  | Low     |
| 29 | IMSLI     | Rp 3,581,546  | Low     |
| 30 | IDN       | Rp 3,661,399  | Low     |
| 31 | IDL       | Rp 2,654,143  | Low     |
| 32 | JTM       | Rp 1,694,253  | Low     |
| 33 | KSM       | Rp 3,589,391  | Low     |
| 34 | KG        | Rp 4,289,018  | Low     |
| 35 | KPSGKK    | Rp 3,662,072  | Low     |
| 36 | MTL       | Rp 2,728,610  | Low     |
| 37 | MML       | Rp 3,582,131  | Low     |
| 38 | PI        | Rp 2,002,761  | Low     |
| 39 | RN        | Rp 2,207,450  | Low     |
| 40 | RPMM      | Rp 1,555,539  | Low     |
| 41 | RB        | Rp 2,187,149  | Low     |
| 42 | ST        | Rp 1,555,539  | Low     |
| 43 | SAB       | Rp 3,978,526  | Low     |
| 44 | SAV       | Rp 4,479,726  | Low     |
| 45 | SLD       | Rp 3,479,027  | Low     |
| 46 | SJ        | Rp 3,567,000  | Low     |
| 47 | TS        | Rp 2,366,320  | Low     |
| 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 |
|----|-----------|---------|---------|
| 16 | AFU       | Rp 5,572,025 | Mid    |
| 17 | ALC       | Rp 7,945,738 | Mid    |
| 18 | AQS       | Rp 5,712,716 | Mid    |
| 19 | BSL       | Rp 10,181,532 | Mid    |
| 20 | BMC       | Rp 7,501,485 | Mid    |
| 21 | BNJ       | Rp 8,458,229 | Mid    |
| 22 | BS        | Rp 5,995,292 | Mid    |
| 23 | BNTR      | Rp 7,880,989 | Mid    |
| 24 | BBV       | Rp 12,072,668 | 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).

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

| 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.

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