Using Data Mining to Increase Customer Life Time Value

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Abstract: - In the recent years, customer relationship management (CRM) is an important issue for marketers. Most of marketing researchers intend to compute customer value and provide valuable activities when customers demand are occurring. Unfortunately, the linkage between customer value and campaign management is still missing. This research proposes lifetime value (LTV) model in analyzing customer lifetime value to construct new promotion plans. To conduct a case study, this investigation extracts more than ten thousand customer data from a Nissan dealer for finding the customer detection. From evaluating the customer lifetime values, we found two interesting outcomes. The first one is that the activities of maintenance item is more valuable than those activities of car purchasing and car insurance. The second one is that a lot of new customers lost their loyalties on the second year. To solve the two problems, this research suggest the studied Nissan dealer should take two corresponding promotion strategies. First, the dealer should provide five-years assurance for new car purchasing customers to increase their loyalty. Secondly, they need to decrease the price of maintenance and speed up the process of maintenance to attract customers.

Key-Words: - Customer Relationship Management, Customer Lifetime Value, Data Mining

1. Introduction
Customer Relationship Management (CRM) is one of the most important strategies for many corporations to retain customers and keep profits in the global competitive environment. The major tasks of CRM include customer acquisition, customer development and customer retention [4]. Most existing researches focus on using lifetime value to compute the value of customer. For example, Verhoef applied a regression model to predict the potential value of customers in the insurance industry[11]. Hwang used LTV model on the wireless telecommunication industry in year 2005 [6]. Unfortunately, most existing researches still stay in academic study. Most of private sectors did not know how to use customer value to increase their value and profitability. This paper is aiming to demonstrate the application of using the customer lifetime value model in finding the problems of customer detection and create new strategies for value creation. Based on the proposed procedure, most companies can find the customer detection and provide a better strategy for increasing customer value. By using the customer value evaluation processes, the potential customer value can be added. In this paper, the proposed concept is applied in a case study of automobile industry.

2. literature Review
Two significant issues must be addressed in this study. First, the existing data mining researches would be reviewed. Secondly, the previous studies of custom life time value should be depicted shortly.

2.1 Customer Value
Most companies dedicate all of their resources to attract customers, but not all of customers are valuable. Since 1980, many corporation and researches developed customer relationship management to sustain the profitable customer as longer as possible [5,9,12,13,14]. In previous study, CRM comprises the activities; customer acquisition, customer cultivation, and customer retention [6]. The customer value are classified into three categories; current value, potential value and loyalty [6,11]. The value creation process consists of three key elements: the value customer receives; the value organization receives; and, by successfully managing this value exchange, maximizing the lifetime value of desirable customer segments [10].
2.2 Data Mining
Even CRM had employed in the real world for half of a decade. Still a lot companies face the painful problem in losing their most profitable customers daily. Some studies began to use data mining as a tool to dig out the hidden problems of missing customer loyalty [2,17]. The technology of data mining is defined as a sophisticated data search capability that uses statistical or intelligent algorithms to discover patterns and correlations in data [3,15]. Several studies use data mining to segment customers in bank, insurance, telecommunication industry, retailer, hospital [1,6,7,8,11,15]

3. Mining Customer Value
Recognition of the importance of relationships in recent years has inspired marketers to focus on the maintenance of exchange relationships rather than on the accumulation of transient transactions[16]. IBM Corp. recommends four steps to employ relationship marketing with valuable customers (see Fig. 1). First, product information has to be prepared by marketers. Secondly, marketing and merchandising techniques need to deliver key information to customer through multiple mediums, such as webs, e-mail, POS and call. Thirdly, the merchandising results would be analyzed into the forms of business intelligence. Finally, the business intelligences would be utilized to construct the profile of customer for understanding the behaviors of customers.

The purpose of CRM is to min customer value for finding a good successful promotion plan. Most of existing researches only focus on mining customer behavior and fail to link with any promotion plan. To cope with this problem, this research proposes a customer lifetime value model to conduct data mining in finding the changes of customer value. From the analyzed result, automobile dealer can figure out the trend of value creation processes. Then a valuable promotion plan would be generated to establish a good relationship with customers and increase profitability (see Fig. 2).

4. Customer Life Time Value Model
To analyze the lifetime value of customer, the core costs of customer in automobile industry incorporates three items; purchase, insurance and maintenance. The purchase information represents the cost of purchasing a new car. The insurance information denotes the cost of customer attending an insurance policy. The maintenance cost is the expenditure on maintaining a car annually.

Furthermore, the revenue for each customer and items are different. For example, the average revenue of purchasing a new car is close to seven percentages. The average revenue of inviting a customer attending an issuance is fifty percentages. Based on this notation, the average revenue for each items are different. In this paper, the LTV model is defined as following:
Current Value = 
\[
\left( \sum_{c=10}^{C} V_{I,c} + \sum_{i=1}^{I} V_{I,i} + \sum_{t=1}^{T} V_{I,t} \right) (1+r)^{t-1} \ldots (1)
\]

Where:
- \( V_{I,c} \): The Average Revenue of Car Purchasing Profit
- \( M_{I,c} \): Car Purchasing Profit Contribution of Customer \( i \) at Period \( c \)
- \( V_{I,i} \): Insurance Profit contribution of Customer \( i \)
- \( I_{ext} \): The average revenue of Insurance Profit
- \( V_{I,t} \): Maintenance Profit contribution of Customer \( i \) at period \( t \)
- \( M_{I,t} \): The average revenue of Maintenance Profit
- \( r \): Interest Rate
- \( t \): The length of years which cars are purchased

5. Case Study

To conduct an empirical study, this study collect 12598 historic data of 10456 customers from a Nissan automobile dealer in Central Taiwan (see figure 1). From the aspect of customer data in table 1, we found that 86.97% of customers purchase only one car and 13.03% of customers own two cars or more. Under the investigation, the most popular models are Sentra, Cefiro and March (see Table 2). Based on the analysis of our study, the customer lifetime value is gradually increasing annually (see Fig. 3), but not all value item are increasing.

From Fig. 4, we found that only the value of maintenance item is increasing annually. Car purchase and insurance would not the most value-added processes. Fig. 5 shows that the numbers of customer are decreased gradually after the second year. It means that most customers lost their loyalties on the second year. After data mining, we suggested that the studied Nissan dealer need to launch a new promotion plan to retain customer on the second year and increase customer value on maintenance.

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
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<tbody>
<tr>
<td>Number</td>
<td>9172</td>
<td>1102</td>
<td>168</td>
<td>37</td>
</tr>
<tr>
<td>Percentage</td>
<td>86.97%</td>
<td>10.45%</td>
<td>1.59%</td>
<td>0.35%</td>
</tr>
<tr>
<td>Year</td>
<td>5</td>
<td>6-12</td>
<td>Over12</td>
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</tr>
<tr>
<td>Number</td>
<td>22</td>
<td>39</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 The Distribution of Car Model

<table>
<thead>
<tr>
<th>Model</th>
<th>March</th>
<th>Sentra</th>
<th>Cefiro</th>
<th>X-Trail</th>
<th>Serina</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>2070</td>
<td>4662</td>
<td>2797</td>
<td>874</td>
<td>252</td>
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<tr>
<td>Percentage</td>
<td>16.43%</td>
<td>37.01%</td>
<td>22.20%</td>
<td>6.94%</td>
<td>2.00%</td>
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<table>
<thead>
<tr>
<th>Model</th>
<th>Teana</th>
<th>Primera</th>
<th>AD Resort</th>
<th>Cabstar</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
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<td>262</td>
<td>113</td>
<td>141</td>
<td>1277</td>
</tr>
<tr>
<td>Percentage</td>
<td>1.19%</td>
<td>2.08%</td>
<td>0.90%</td>
<td>1.12%</td>
<td>10.14%</td>
</tr>
</tbody>
</table>

Table 1 the Basic Customer Information based on the Length of Year

<table>
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After several creation meetings, a credited-based program is designed by the Nissan deal. In this program, the dealer would provide five-years assurance for all of new car purchasing customers to increase their loyalty. From the marketing surveys, we also found that prices and time consuming on maintenance are two key factors of affecting customer’s maintenance. To improve such problems, the dealers began to decrease the price of maintenance and speed up the process of maintenance to lure customers. The details of two proposed strategies are shown in table 3.
6. Conclusion

Even CRM had applied in several industries by many well-known companies such as IBM, Cisco. At the mean time, a lot of previous researches proposed data mining to find the patterns of customer behavior [3,15]. For instance, Hwang and Verhoef applied different models to compute the customer value [4,11]. The link between customer value and promotion plans is still missing. To deal with the obstacle, this paper proposes a mechanism to mine the value of customer lifetime value for support a valuable promotion plan. The major contributions for this paper as follows:

- Propose a customer value model in automobile industry
- Connect the customer value and promotion by data mining

This study compute the customer value of 10456 data. From evaluating the customer lifetime value, we found two interesting outcomes. The first one is that the activities of maintenance item is more valuable than those activities of car purchasing and car insurance. The second one is that a lot of new customers lost their loyalties on the second year. To solve the two problems, this research suggest the studied Nissan dealer should take two corresponding promotion strategies. First, the dealer should provides five-years assurance for new car purchasing customers to increase their loyalty. Secondly, they need to decrease the price of maintenance and speed up the process of maintenance to attract customers.

After this study presents a LTV model to find the problems of customer detection and provide value creation strategies, one of major problems for promotion is to search the right and profitable customers. In the future, more researches should be conducted in the area of targeting customers to assist automobile retailers implementing effective promotion plans.

Acknowledgments

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References:


