Analysis of the Customer Value and Loyalty on Business

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Abstract—**This paper focuses on the existing constraints in the operation of an e-commerce company, Yaheetech, under the global outbreak of Covid-19. The unprecedented increase in profits brings the company a large population of customers and the company has no experience in analyzing customer value and royalty. The company is eager to develop its new customers into future assets and afraid of losing its customer by the time Covid-19 is well handled. With the stated goal of the company, this paper aims at analyzing customer value and royalty by using the Recency-Frequency-Monetary (RFM) model. The data used in this paper is from the order records of the independent websites consists of 9875 items. Through the process of cleaning data, calculating the value of variables and construct the rating system, the model can segment the large population of customers into 8 distinct characteristic clusters which allow the company to apply specific strategies for different customers.**

Index Terms—**customer value, customer royalty, RFM model, customer segmentation, clustering, business analysis**

I. INTRODUCTION

The paper is on an e-commerce company named YaheeTech. The company is founded in 2003 in Shenzhen, China, as a new generation cross-border trade company. It had over 100% growth in sales revenue in the first half of the year 2020 compared to that of year 2019 which result in rapid growth in the population of customers. [1] This phenomenon occurred mainly due to the lockdown caused by covid-19, people who used to work in the office or attend school in person had to work or study at home so that the demand of trending products of the company like office chairs, desks and outdoor goods increases dramatically. Although the company's profit reached the apogee in history, such increment won't sustain a long time since life will go back to normal once Covid-19 situation mitigates. Such concerns were raised from the lack of study on its customers. Since it has a lot more customers, analysis on customers is pressing because their contribution to company's glorious milestone is undeniable.

The current operation of the company only understands what kind of product is trending but has limited knowledge of its customers. This paper focuses on how to analyze customers' value and royalty as well as its advantages. One viable method to analyze customers is to quantify their value and loyalty level by using the RFM model. Each customer will be assigned several characteristic values and segmented into different clusters. The company will be able to narrow down its huge population of customers into several clusters sharing similar characteristics. It enables the company to have the ability to distinguish customers and apply the most suitable strategy to different clusters of customers.

II. CUSTOMER VALUE AND ROYALTY

Under the ever-increasing trend of globalization, competitions between companies are not limited to domestic anymore, thus more intense on a global scale. A company which wants to stay in the game must analyze the relationship with its customers. Although the number and quality of customers that a company possesses determine the future of this company, customer value and loyalty are crucial indicators of the relationships between customers and companies.

A. Definition

Broadly speaking, customer value consists of both the profit customers bring to a company and the profit a company brings to customers. However, this paper is conducted from the perspective of the company so only the profit customer brings to the company is relevant. Customer value includes current profit and potential profit. Current profit is calculated by revenue brought by the customer minus the cost, but it does not take potential future profit into account. Potential value can be reflected by customer lifetime value known as CLV which is a sophisticated concept developed by Reichheld (1996). [2]

Gremler and Brown defined customer loyalty as the degree to which a customer exhibits repeat purchasing behavior from a service provider, possesses a positive attitudinal disposition toward the provider, and considers using only this provider when a need for this service exists. [3]

B. Benefit

One might think that as a company owns more shares of the market, it will grow at a steady rate, however, this is a unilateral view since not every customer brings positive profit for the company. Customers who bring positive and high profits are considered high value

customers and those who bring low or negative values form the basic customer value measure. Nevertheless, there can be more segments in this system such as middle value, low to mid value and so on which depends on the number of clusters a company prefers. Each segment can be further characterized by the level of loyalty. For instance, people who have high value can be either royal or not royal.

The long-lasting prosperity of a business seems very challenging, however, with the help of analysis and improvement of customer value and loyalty is possible.

Firstly, high value and loyal customers tend to repurchase the next generation of products and services from the same company. Such support improves the company's reputation which allows the company to launch new designs or technologies that are relatively unseen in the market. [4] On the contrary, other brands do not have such freedom when they launch new products.

Secondly, high value and loyal customers are willing to share their purchasing experience with people around them. The advertising effect that these customers bring is more effective than that of large cost on advertising to the public.

Lastly, the cost of managing a business will decrease with the increment of high value and loyal customers since their repeated purchases and recognition for the company will lower the expense of advertising. In all, royal customers purchase more frequently than non-loyal customers and they are likely to purchase other products offered by the firm. [5] It increases the level of diversification thus decreases the operational risks of the company.

III. Constrains on Current Operation and Future Concerns

Companies' long-time survival depends on profits, growing profits enable companies to have sustainable development. More importantly, profits accumulate from purchasing products or services from customers to companies. Customer loyalty is seen to be crucial to the success of business organizations, since attracting new customers is far more expensive than retaining existing ones.[6] Therefore, no matter what strategies or goals a company holds, it should use its best effort to keep high value and royal customers.

A. Limited Knowledge of Customers

The company is experiencing a booming profits and population of customers, its expectation to keep this trend is difficult because the company has no previous practice of managing a large number of customers. Because of this limitation, the company cannot identify how valuable and loyal a customer is which causes opposite forces in making strategy.

B. Risk of Losing Customer

Many customers are new to the company because of the global Covid-19 pandemic. It is palpable that the company will lose them when they do not need to work or study at home. The demand for the trending products of the company like office desk and chair will slump when the crisis is over.

IV. Analysis on Customer Value and Loyalty

A. Data

The company sells products on both third-party websites and independent websites. The data for this paper is derived from its independent website due to the privacy regulation of third-party websites. The data consists of 9875 order records from January 1, 2020 to June,30,2020 including customer registered id, date of payment, product purchased, order status, the amount paid, delivering cost, location of delivery, and the number of products per order. [7]

B. Model Set up

i. Overview of RFM model and implemented with Python.

The paper is conducted using the RFM model introduced by Arthur Hughes (1994) which is one of the most used models to analyze customer value and loyalty. [8] RFM model consists of three variables, namely time between purchases, frequency of purchases and amount of money purchased.

Data cleaning is necessary before applying the RFM model to the company's dataset. Since canceled order is irrelevant, any order which is canceled is deleted from the dataset. Moreover, the RFM model only needs customer information registered id, date of payment and amount paid, other variables are deleted from the dataset.

ii. Calculation on the value of variables.

R stands for recency which is the length of time since the last purchase from July,1,2020. The recency of a customer continues to change, for example, if a customer purchased a product one month ago and made the next purchase on the last day of the time range of this dataset, then the value of R is one. F stands for frequency which is the number of times purchased during a period of time. It is calculated by counting each order of one customer. In this case, if a customer had five orders during the time range, half a year, then the value of F is five. M stands for monetary value which is the average amount of money spent each time purchased during a period of time. It is calculated by divided the total amount spent by a customer during the time range from the number of times purchased.

iii. Rating of customers based on the value of variables.

Value of R, F and M are assigned to each customer; However, it is hard to distinguish customers by looking at their value. Therefore, it is helpful to segment customers with similar value into clusters. A rating system is used to achieve the goal and it has a rating score of one to five for each value of R, F and M respectively where one is the lowest score and five is the highest.

For rating of R, five points are assigned to value between 0 and 30 exclusively, four points to value between 30 and 60 exclusively and so on. Any value greater than 120 earns one point. For rating of F, each purchase earns one point and any value of F that exceeds five earns only five points. For rating of M, the width of each range is 50 starting with one point given to value of

M between zero and 50 exclusively and any value greater than 200 earns five points. Hence, the rating system gives score for each variable of a customer.

C. Application

iv. Clustering of Customers based on RFM Model.

The required data needed for analyzing customer value and royalty is complete. The current rating system produces cubic of five, 125, clusters which do not narrow down the scope enough for the company to do any realistic decision making. Therefore, further clustering such as compare the score of each rating of R, F and M with the average score correspondingly and assign a new score of either zero for lower than average or one for greater than average. The new score produces 8 clusters of customers with different characteristics in Table I.

TABLE I. CLUSTERING OF CUSTOMERS BASED ON RFM MODEL

If R value greater than the mean	If F value greater than the mean	If M value greater than the mean	Traditional Classification	Advanced Classification	Characteristics
1	1	1	Important value customer	Important value customer	Recently shopping, high frequency, high consumption
1	1	0	Important potential customer	Potentially consumption customer	Recently shopping, high frequency, low consumption
1	0	1	Important developing customer	Frequency developing customer	Recently shopping, low frequency, high consumption
1	0	0	New customer	New customer	Recently shopping, low frequency, low consumption
0	1	1	Important recalling customer	Important early warning customer	No recently shopping, high frequency, high consumption
0	1	0	Average customer	Average customer	No recently shopping, high frequency, low consumption
0	0	1	Important regaining customer	High consumption recalling customer	No recently shopping, low frequency, high consumption
0	0	0	Lost customer	Lost custmer	No recently shopping, low frequency, low consumption

i. Empirical analysis.

In Table I, customers are segmented into eight clusters. Each cluster has two classifications, namely traditional and advanced classifications. Some of the traditional classification is opaque thus the advanced classification is proposed which suits the company better. The column of characteristic contains more details on R, F and M. Clustering of customers gives insight in managing the company's large population of customers to the old operation and also alleviate the predicament where the company has limited knowledge of its customers.

After all, the ultimate goal of the company is to maximize profit so clusters with value of M equal to 1 are crucial to the company such as important value customer, frequency developing customer, important early warning customer and high consumption recalling customer. According to Pareto's law which is also applicable in business analytics, 80% of the revenues came from 20% of the customers. The customers in these clusters have a higher than average consumption which accounts for most of the profits earn by the company. Within these four clusters, only important value customers are both high value and royal thus the company would have their support by just operating like normal. However, frequency developing customer and important early warning customers either make their last order relatively long time ago or make orders not as often. These customers have high value but not as royal as the important value customers and targeted advertising like sending appreciation email to customers who used to make frequent orders with high consumption can stimulate them to repurchase.

Recency and frequency are also useful indicators of customers. The company can target customers whose value of R is greater than the mean since that delivers a stronger signal of willingness to purchase more products. With a constantly updated database, comparing the number of customers with value of R equal to 1 to the previous month can be an indicator of how well the company is keeping their customers. Therefore, a company should utilize such information to recall customers whose value of R equal to 0 by giving up some immediate interests in exchange for long-term loyal customers who bring more profits in the long run. Moreover, recency and frequency indicate the risk of losing a customer. Clusters that have the value of both R and F equal 0 shows that the company is more likely to lose customers of such clusters. For example, high consumption recalling customers make neither any recent purchase nor frequent orders but spend a lot. They might not purchase again but they are of high value so that the company should try their best to get them to purchase again like giving them discounts or other stimulating advertising.

V. CONCLUSION

This paper takes raw order records of the company and applies RFM model on the cleaned dataset to analyze customer value and royalty. The model calculates value of R, F and M of each customer and segments them into eight clusters with distinct characteristics. This helps the company solve the problem of limited knowledge on the large and increasing population of customers and then improve the decision making like advertising. The company now is able to apply specific strategies to different customers so the concerns on losing customers assuage relatively.

The application of RFM model to the company's situation is basic in this case since the company just starts

the process of analyzing customer value and royalty. There are more variables called expert factors that needed to be considered when companies accumulate more experiences in this field and develop their own preference for analyzing their customers. These expert factors account for the characteristics of customers that a company regards as important, and statistic models with expert factors can mimic the real situation better.

The impact of customer value and loyalty on business is enormous. Although RFM model is well practiced, the analysis of customer value and loyalty is not limited to RFM model because each company has distinct features and goals. To acknowledge the importance of relationship between customers and company is more valuable.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

In the whole process, the author herself collects, organizes, thinks, revises and finally completes this article.

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